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COMMUNICATION NEEDS AND COMPUTER UTILIZATION AT THE UNIVERSITY OF ALBERTA

by

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Supervisor

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TO MY FAMILY.

In the beginning was the Word, and the Word was with God, and the Word was God. He was in the beginning with God; all things were made through him, and without him was not anything made that was made (John 1:1-3).

ABSTRACT

This study was designed to examine the relationship between users and computing services at the University of Alberta. The purpose of the study was to determine the perceptions of needs relative to the uses in computer applications from the point of view of the users.

The study also investigated the differences of the perceptions among users, and the differences by respondent characteristics in three different types of computer application.

The data were collected using a questionnaire designed especially for this study. Usable returns were received from 79 staff members. The selected sample provided a 50% response return.

The findings indicated that there were some needs the respondents perceived for information about computing applications in the university under study. The most important needs for computer users were information on compatibility among microcomputers and computers, and to attend in-service workshops related to computing applications. The least important needs were to learn about the operation and function of the university's services regarding computers and to learn about political factors influencing computer resource allocation on campus.

The respondents did not perceive major problems in using the computer systems, rather they expressed some annoyances related to the systems. The main concerns were the overload of the computer system and the consequent poor response time during regular terms. In general, the communication between the users and the computing services on campus was characterized as a functional relationship. In addition, the overall rating of the effective communication of those services regarding computing applications was considered good, primarily with the MTS system.

Implications of this study for improving computing applications at the University of Alberta are suggested. It is proposed that: commitment to application of computer systems be included in the policies of the university administration; computing application centers be established on campus; participation in computing application activities be encouraged through appropriate recognition of active participants; computing application activities be introduced to the least knowledgeable groups; computer courses be taught through appropriate personnel; adequate funding be provided and allocated for computing applications; development of computer workshops and seminars should be encouraged; and, the use of microcomputers should be coordinated with the central computer policy.

A number of recommendations are made for further research in the area of computing applications. It is recommended that studies similar to this one be conducted with other faculties within the university; that further studies be conducted on such topics as students' perceptions of computing applications; a more extensive study relative to the effective communication of computer services should be undertaken; the efficiency of computing applications with respect to enhancing fiscal accountability should be investigated; and an examination of computer systems documentation should be conducted. These recommendations are applicable to the University of Alberta.

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Chapter I

OVERVIEW OF THE STUDY

A. Introduction

Recently an increasingly complex world has challenged many of our traditions. Technological change, economic recession and changing social values have left an impact upon the way in which we live. These complex and diverse factors present many opportunities to respond to the stimuli which are part of the environment.

The use and application of computer technology in our society is one of the challenging opportunities confronting us at the present time. As recently as ten years ago, it was rare for an individual to know or have direct contact with more than three computer systems. Today most people, as part of their daily life, receive information prepared or produced by a computer. We all see advertisements for computers and microcomputers daily on television and in local papers. There are many examples illustrating how computer technology has found its way into our everyday lives. Hence, we are rapidly learning to cope with it.

Unfortunately, even now, there is a tendency to regard computer technology either as a universal panacea for problems, or as a terrible threat to the individual. In relation to this Spuck and Atkinson (1983:90) state that:

> "Computer Phobia" has been widely discussed and unquestionably represents real concern among staff members who feel- either correctly or incorrectly - threatened by the new technology. A comprehensive

> staff development plan must be developed so that every person who will be called to interact in any way with the computer system can participate; the plan must set forth specific objectives, responsibilities, skills to be attained. The plan must establish a time table for accomplishing the objectives and integrate the staff development process with the implementation schedule for the computer system itself.

Institutions of higher education have generally been recognized as extremely stable and beneficial institutions. They provide a variety of educational, cultural, research and recreational programs. However, as stable as they have been in the past, universities and educational organizations are beginning to feel societal pressures requiring them to accomodate courses which are more relevant to real life situations.

Also, institutions of higher education are involved in their communities and have a major responsibility to organize the best possible response to community needs. These organizations should encourage their faculty and staff members to participate in the application of new technologies. The recognition of such needs and of the role educational organizations should perform in public service, can lead to more effective use of computers in the educational field.

Effective use of computers will assist these institutions not only to fulfill their missions but to accomplish community goals and objectives.

As Rowland (1980:93) observes:

> "Lifelong learning", the most commonly seen future for higher education, includes the use of colleges

> and universities by nontraditional students for new occupational training and by professionals to keep current in their fields. It also means meeting people where they are to provide the educational services they need.

It seems reasonable to expect that educational organizations will have some unique characteristics. These characteristics may involve its organization, the program it offers, the way in which instruction is provided, or the particular needs and clientele which the institution has undertaken to serve. Some of the needs of the clientele or the organization can be satisfied by choosing the necessary technology.

There are several fundamental uses of computer technology in institutions of higher education. While these uses are not mutually exclusive, they can be described as distinct classes of use which relate to the educational organization. Some of these examples are:

* Administrative applications

  Some organizations operate computers to handle the bulk of data in administrative work, and which also provides information for planning and budgeting purposes.

* Library applications

  With the number of data banks available today, it is possible to use a computer terminal to search commercial information systems by way of a telephone line or other hook-ups to a larger data center.

* Research applications

Most computer systems have software statistical packages which can be used by personnel of educational organizations involved in action research or evaluation projects within the educational system. Analysis of data collected on a regular basis can provide relevant information for decision-making and planning. Also, studies in computer science and technology include comprehensive work in computer architecture, applications, programming and operations. These are usually specialized programs which may lead to further computer science education.

* Instructional purposes

Computers when used as teaching aids apply adequate procedures or interactive modes, and are becoming an important educational tool. This application of the computer in education can involve the computer taking over a central part of the direct instruction of the students. Instructional activities with the computer can be classified into four main modes. They are: drill and practice, tutorial, simulation and games, and problem solving.

One of the main applications of computers involves the administrative use of computers. The use of the computer in the administration of education arises from the need to deal quickly, untiringly and accurately with large volumes of data. In addition, the computer provides a mechanism for supporting academic needs. Instruction and research in educational organizations are facilitated through use of word processing and special software, such as computer assisted instruction and statistical packages.

It is apparent from the enormous body of literature on computer applications that computers have an important role to play in problem-solving and information-processing activities associated with business. The use of computers by churches, recreational organizations from which services are provided, and by doctors and hospitals are a few of many examples.

Historical Synopsis

In 1957 the University of Alberta[1], began to foresee the use of a digital computer oriented especially for the solution of many problems constantly arising throughout the institution related to user's needs. At that time a "Committee of Electronic Equipment" was appointed to assess computing needs. The committee recommended the acquisition of the Royal McBee LGP-30 computer which was housed in the Physics building and began to operate in August 1958.

The need for updating information and the use of new peripherical devices for faster processing, increased during the following years. In October 1961, an IBM 10 card punch, an IBM 082 card sorter, an IBM 407 accounting machine and an IBM 514 reproducing card punch were installed to complement the existing equipment. Most of the programs for this computer system had to be written especially for each application.

---

[1] The historical information was obtained from the Computing Services Bulletin and documents developed for that purpose.

The SHARE library was established in 1963, where users made many software packages available to others. The system at that time included the GO monitor which allowed for job to job transition without operator interaction, a fast FORTRAN II compiler and a fast SPS (Symbolic Programming System) called FAST. Again, in that year, the need for more computer power was recognized and an IBM 7040/1401 system was ordered.

However, because more users wanted more applications to be handled by the computer system, the IBM 7040/1401 became over burdened and an IBM 360/67 system was rented to alleviate the anticipated computing load of the near future. A major consideration in selecting this new machine was the degree of difficulty in converting users' programs. That system was installed in 1967.

Because of the increased number of users, in 1968, a group of people were charged with the responsibility of disseminating information to all users. This included courses, handling users' problems and providing a liason between the centre and the users. Due to the growth of the hardware installed by that time and the inadequate size of the room, a move to a larger center was necessary. The computers were relocated on the second floor of the General Services building. The offices were also located on the second and third floor of the same building.

Up to 1969 the IBM 360/67 system had a total of 768,000 bytes of core memory, a drum, two 2314 disk drives, eight tape drives, a grid interactive graphics unit, fifty-six terminal lines, two printers, two card readers and two card punches. The operation system was the IBM Operating System (OS/360) which included compilers and software packages such as ASSEMBLER, FORTRAN, COBOL, SORT/MERGE and a set of utility programs for file updating and maintenance.

In 1966, the Administrative Data Processing Department (ADP) was installed in the basement of the Administration Building. Today, this center is called the Office of the Administrative System (OAS) and is located in the main floor of the Student Union Building (SUB). The major purpose of this system is to support the administrative processes of the university such as: (1) student records; (2) financial records; (3) staff records; (4) university resources records (e.g. buildings, equipment among others). In 1969 the Office of the Administrative System (OAS) received their own computer system. It was an IBM 360/40. At present they have an IBM 3081, which is similar to the 370's system.

The main service which this system makes available is the use of software packages provided by IBM. The primarily users of these packages are the Registrar's and Controller's Office. Secondary users are faculties and departments of the University of Alberta. Another package this system controls is the on-line catalogue for the library called Dortmund On-line Bibliographic Information System (DOBIS).

The personnel of this system function as computing facilitators for the use of those packages and ensure the security and integrity of the information processed.

The Department of Computing Services was officially separated from the Department of Computing Science in the year 1971. Also the Operating System (OS/360) was replaced by the Michigan Terminal System (MTS) in that year. This system operated in a time sharing environment using the paging concept with the capacity to support multiple terminals. A PDP 11/45 was used as a terminal controller with the ability to connect forty ports.

A new central processing unit Amdahl 470/V6, was installed in December 1975 and a new version of the MTS operating system was created to support its capabilities. This Central Process Unit (CPU) was upgraded to an Amdahl 470/V7 in 1979.

The main frame computer had experienced various changes over the last five years. In July 1981 it was upgraded to an Amdahl 470/V8 and in January 1983 to an Amdahl 58/5860 with the capacity to handle more than 16 megabytes of real memory on a single processor system. That capacity was increased because of the influence of the users and their applications for different software packages.

In 1980, the PLATO Computer Assisted Instruction (C.A.I.) system was placed on campus and established the first PLATO laboratory at the University of Alberta. The major purpose of this system was to provide training services to departments and faculties on campus. It provided a university wide support service for delivering computer assisted instruction. The primary mandate of this group was to help people on campus to identify some of the existing course material that came with the PLATO system, and to assist individuals to develop their own courses for delivery.

For sometime, the University of Alberta has been actively participating in EDUCOM activities. EDUCOM is a non-profit consortium of colleges and universities which arranges among other things seminars that are related to the use and application of computers in higher education. Parts of the materials produced by EDUCOM which are related to this study are included in the literature review.

On January 16, 1984, a group was formed and named Planning Group II. It was a temporary group of university staff and was one of four groups created by the Central Administration. It was to report to the Vice-President Academic. The special activity of this group was to formulate medium to long term plans regarding computers, computer communications, and information systems on campus at the University of Alberta.

Recently, there has been an explosion in the demand for services in computing, particularly in the development of new applications and software. Paradoxically there is a growing body of potential users who feel they are unable to make effective use of the new developments because of real or perceived lack of technological expertise (Conrad 1982:193).

These factors have created an interest in determining more specifically the actual and potential information-seeking relationships between the users and the services of computing. These relationships are considered in the light of the perceived overall effective communication of the variety of services offered by a computer center.

B. The Purpose of the Study

The purpose of the study is to identify the relationships between users and their employment of services in computing. In addition, the perceived effectiveness of communications by the Department of Computing Services is investigated from the point of view of the users.

The study focuses upon three areas:

1) Information-seeking behavior, in relation to the use of computers.
2) Current computer applications (mainframe or mini/micro computers).
3) Effective communication of the current relationship between the computer application in each faculty and the computer services applied.

In order to obtain answers in the above areas, questions were phrased to seek in-depth answers that would provide information about the current level of understanding about computer technology.

1. What do the users actually need?
    a. What is the general level of knowledge of users concerning computer applications?
    b. What are the fundamental computing tasks of the users?
2. What do the users perceive their computing needs to be one year from now?
    a. What do the users think they may require of the computer system?
    b. On what basis have the users arrived at this perceived requirement?
3. What computer systems are currently used?
    a. Do the users employ systems other than the Amdahl/MTS system?
        1) What software/hardware is used for which tasks?
        2) How do the users decide on the use of the mini/micro computer application?
    b. Do the users employ the Amdahl/MTS system?
        1) What software is used for which tasks?
        2) How do the users decide on the MTS application?
4. Do the users know what type and amount of resources are available to them?
    a. What financial funds are available?
    b. What technical resources are available concerning computer applications?
    c. How did the users become aware of these resources?

5. How is communication between users and computing services characterized?
    a. What type of communication takes place?
    b. What is the frequency of the communication?
6. What kind of problems are users encountering in the application of the computer system?
    a. Is there any difficulty encountered in understanding the technical documentation?
    b. Is consultation readily available?
    c. How effective is the communication?
7. What is the users' perception of the communication of services offered regarding computing on campus?
    a. Are the administrative applications effective?
    b. Are the library applications effective?
    c. Are the research applications effective?
    d. Are the instructional applications effective?

C. Limitations

1. The study is limited to 7 selected departments at the University of Alberta.
2. The respondents were chosen from full-time faculty members at the University of Alberta.
3. The study is focused upon the perceived effective communication of the Department of Computing Services in terms of aims and relationships with actual and potential users.

D. Assumptions

1. The faculty members of the departments approached possess an adequate understanding of computers necessary to answer the questions.
2. The data gathered is authentic information applicable for the study.
3. The results or findings of the study may be applicable to similar settings. This is based on the assumption, that both the University and Computer Services Department are typical of many institutions of higher education.

E. Significance of the Study

This study centers on the need for research in how to develop a more effective relationship between users and technology. The rationale and recommendations from the completed study may lead to a possible redirection in allocation of resources with a concomitant reorientation of the role of Computing Services in the University from the users' point of view.

Brown (1980:33) states that the people who will best be able to provide user services in the computing environment will be those who are best able to understand users' problems from the users' point of view.

This study is significant in that it will suggest universally applicable policies and procedures regarding the relationship between users and computer services. This study attempts to provide information concerning the present perceived effectiveness of this relationship. Consequently, the suggestions to improve this relationship will allow managers of Computing Services and the administrators of the University to make the necessary modifications needed to improve communications in that environment. An analysis of the information obtained will provide implications for further research.

A descriptive analysis of the relationship may lead us to a better understanding of how to adapt resources in computing to the problems identified by University administrators and staff members.

The methodology used and tested in this study provides guidance to the operation of other centralized computer service facilities. In addition it demonstrates one set of factors that could lead to a balance in the use of centralized computer application and decentralized (mini/micro) computer application.

This study contributes to the evolving literature that relates to effective utilization of computer resources in an academic environment. Consequently, it provides a framework for comparison in the uses of the computer with members of other organizational settings.

F. Research Design

This is a descriptive study designed to gather data from the users of computer services of the University. Data was collected through a series of interviews and questionnaires seeking to identify general needs or expressed needs of those using computers.

It does not attempt to verify any a priori hypotheses but seeks to identify hypotheses that emerge from the analysis of data.

In order to select the sample for the study, each department was assessed according to the following three dimensions:

1) Classification of departments on campus according to three different purposes of computer applications: (a) scientific computing; (b) social science application; (c) applications different from the previous two.
2) Results of the Planning Group II questionnaire, regarding three departments with high anticipated growth in computer applications;
3) Actual amount (or total expenditure) of computer time used on the Amdahl/MTS system and the proportion of accounts assigned for each department on campus.

The involvement of the departments for the study were based upon the comparison of those three dimensions. Based on these dimensions the departments were then characterized as high intensity users and low intensity users. Two departments within each category were selected for the administration of a questionnaire which was specifically designed for this study and consisted of three main sections.

In the questionnaire:

Section I aimed at gathering essential data about the current computer applications for each department and the computer system(s) they use.

Section II sought responses to a number of items that represent the aims of Computing Services related to actual needs or interests of staff and faculty members and their use of computer resources.

Section III sought to identify the extent to which staff and faculty members are familiar with the assistance available and/or provided for different computer resources on campus.

A sample consisting of the academic staffs of six departments of the University was selected and surveyed using the questionnaire. Selected staff were requested to participate in an in-depth follow-up interview. Information from the interview was to complement the data obtained from the questionnaire and to seek additional related information.

The semi-structured interview was essentially a shorter version of the questionnaire but provided an opportunity for participants to make additional comments and suggestions. The semi-structured interview included actual and potential users from the selected departments.

The questionnaire sent to the selected staff was analyzed and compared to the results of the semi-structured interview and to the global results of the questionnaire administered by Planning Group II. The results of the study are based on the interpretation and analysis of this information.

The design of the study permitted collection of data from three sources:

1. Questionnaire designed for this study;
2. Planning Group II questionnaire;
3. Semi-structured interview assessing information-seeking behavior

Sources (1) and (2) represent a quantitative dimension while (3) adds a qualitative component. This combination provided a means for partially validating the data collected.

G. Definition of Terms

For the purpose of this study, the following definitions of terms are used.

Access. Used as a verb describing the process of obtaining data from a peripheral unit or retrieving it from a storage device.

Computer. A device that can receive and then follow instructions to manipulate information and text as well as numbers.

Computer Assisted Instruction. A teaching process directly involving the computer in the presentation of instructional materials in an interactive mode and to provide and control the individualized learning environment for each student.

Computer Concepts. All the terms related to computers and their applications.

Computer System. The set of hardware and software through which the application is processed.

Computing. Operation related to the characteristics of the computer in order to work with a set of programs, packages that control the execution of systems providing services for the users. Similar term to Computer operation.

Hardware. Physical parts of a computer.

Mainframe. It refers to the central processor itself. It coordinates and controls the activities of all the units and performs all the arithmetic and logical processes to be applied to data.

Microcomputer. A computer based on a microprocessor.

Microprocessor. A small central processor used in microcomputers.

Scientific Computing. Data processing for scientific purposes, usually requiring machines with great computational power and with characteristics of low volume of input-output.

Software. A term used to refer to all programs which can be used on a particular computer system.

Users' Group. An association of people who all have an interest in a particular computer or group of computers. They usually meet to exchange information, share programs and trade equipment.

User-Friendliness. Information provided by a computer system which makes the system easy to understand and to use.

H. Organization of the Thesis

Chapter One presents an overview of the study with the purpose of delineating the area of interest as the use and the application of computer technology at the University of Alberta. A brief historical synopsis regarding the development of computing at the University of Alberta is presented. Also included is a statement of the purpose and significance of the study, the research design of the study, the limitations and the assumptions of the study and a set of definitions to be used.

Chapter Two, presents a review of the literature in the field of higher education in terms of information-seeking behavior, needs assessment, computer applications, centralization versus decentralization of computer resources and the evaluation process.

The design and research methodology is outlined in detail in Chapter Three. The population and selection of the sample, instrumentation used for data collection and analysis procedures are discussed.

The results of the data analysis are reported in Chapter Four. The summary, conclusions, implications, and recommendations for the study and recommendations for further research are presented in Chapter Five.

Chapter II

REVIEW OF THE LITERATURE

This chapter presents literature covering the topics of: (A) needs assessment; (B) information-seeking behavior; (C) computers in higher education; and (D) the evaluation process. It began with a systematic search of periodical indices, card catalogues at the University of Alberta, dissertations, and dissertation abstracts, as well as, the ERIC document reproduction index.

A. Needs Assessment

The term "need" has different meanings. However, present research in both social sciences and medical sciences leans more towards defining "need" as a lack of something which is required for survival and the well-being of the unit under study. This definition is difficult to operationalize and easily becomes entangled in disagreement over the meaning of such an abstraction as "survival", "well-being" and "require".

Needs often emerge from plans, and plans are a means of achieving desired goals. Consequently, the plan is more than a mere statement of a particular need (Scriven and Roth:1978-4).

A needs assessment typically begins by ranking goals for importance. The term "goals" can be used for any set of statements related to desired end states such as desired conditions, solutions to a particular problem, conditions in the institution or other matters on which the decision-makers wish to obtain estimates of relative importance as perceived by client groups. Scriven and Roth (1978:1) state that the assessment of needs is perhaps the most important part of planning and evaluating a program.

Needs assessment, according to Kaufman (1976) is a formal process for determining gaps between present and desired outcomes. His concern is that before jumping to solutions it is better to define problems correctly. Trimby (1979) describes the Coffin model which relies more on decision-making than merely defining problems correctly as in the Kauffman model.

Scriven and Roth (1978) as well as Kaufman (1977) see needs as the gap between as an unsatisfactory condition and the desired objectives in a particular situation. However, they conclude that needs are thus normally relative to whatever accepted standards can be feasibly achieved within the specified time period. In addition to this, needs are also relative to the standards of living we currently recognize.

Traditionally, needs assessment has been defined as a determination of the difference between "where we are now" and "where we are to be". Karges and Bowles (1979) recommend collecting needs assessment data which helps to determine the gap between the existing and the ideal program. They suggest the open-ended questionnaire or interview which can provide data on attitudes and beliefs.

Consequently, we can obtain reactions of people to specific activities being implemented in the program, as well as to identify program strengths and weaknesses.

Witkin (1977) points out the advantages and disadvantages of the alternative procedures used in needs assessments. These include goal setting, goal rating methods, discrepancy analysis, setting priorities and special procedures such as: (1) the Critical Incident Technique; (2) the Delphi Technique; (3) and Fault Tree Analysis. On selecting among these procedures she concludes that perhaps the best guideline for the planner is to ask, "Why do I want to do a needs assessment?" and "What will I do with all the data when I get it?". The answers to those questions may help in selecting the most effective approach to the situation.

The primary purpose of needs assessment in this study was to determine the specific nature and perceived information needs of users of computer services, and to evaluate the program which is assumed to meet those needs. Eventually, information-seeking behavior is oriented toward determining if the perceived need is fully satisfied and how clients perceive their own level of uncertainty with respect to the use of the computer and its application.

B. Information-Seeking Behavior

Information-seeking behavior as mentioned before is oriented toward the identification of the perceived information need and seeks to attain a fully satisfactory solution to the need. The behavior is seen as occuring in the conditions of the normal environment. Krikelas (1983:6) defines information-seeking behavior as:

> ...Any activity of an individual that is undertaken to identify a message that satisfies a perceived need. In this context, information is viewed as any stimulus that reduces uncertainty; need is defined as a recognition of the existance of this uncertainty in the personal, or work-related life of an individual. Information need is defined as "a function of extrinsic uncertainty produced by a perceived discrepancy between the individual's current level of certainty about important environmental objects and a criterion state he seeks to achieve".

In other words, information-seeking behavior begins when someone perceives that the current state of possessed knowledge is less than the needed level to deal with some issue or problem.

Taylor (1968) suggests that a difference may exist between what an individual may perceive as a need and the way the need is resolved. The user would identify the information he wants, the intermediary would formulate the search for information in accordance with the expressed want.

The effectiveness of the information system would be determined on the basis of whether the information want has been satisfied. The major problem with elevating information want to a primary position in information transfer is that often the user cannot identify the information he wants. That means that the user cannot tell you what he does not know.

In a study of the selection of channels when seeking information, Hardy (1982) uses two models of selecting information sources. The Cost/Benefit model proposes that information seekers select information sources on the basis of expected benefits and expected costs of using an information source. The Least-Effort model maintains that information seekers select information sources on the basis of minimizing the effort or cost in obtaining information, while even sacrificing the quality of the information to be obtained.

Accordingly, simply making information available is not sufficient to ensure its use. The manner in which people seek information is an important consideration in making sure the users obtain the information they need. If one makes the alternative assumption that people would use the easiest source, regardless of the quality of information found, the content from that source could be devaluated in order to improve accessibility.

How might university professors and students use information systems in the process of information seeking? Rouse and Rouse (1984) consider that humans seldom seek information as an end in itself. Instead, information-seeking is a part of the process of decision-making, problem solving or resource allocation. In general they say that information-seeking is one aspect of the overall process of system management regardless of what the system is.

The classical definition of the value of information as Krikelas (1983) views it, would be likely to emphasize the reduction of uncertainty. The difficulty with this definition is that humans frequently are concerned about a variety of things which have little bearing on the present problem or situation. The conclusion is that for information to be valuable it must be relevant.

From this perspective Rouse and Rouse (1984) assert that in order for an information seeker to determine the value of an information source or item, one must (perhaps unconsciously) evaluate the information along each attribute or dimension and then, in some way combine these individual evaluations into an overall assessment. It seems reasonable to attribute much of the variability in human information-seeking to individual differences. Information needs, at least in terms of quantity, vary with the stage of problem solving and change with the experience of the individual using the information (Cox and Fletcher:1976).

Consequently, the approach followed by Krikelas (1983) in information-seeking behavior begins by identifying the different types of information seeking behavior which are; information needs, information gathering, and information giving. Therefore in order to identify those steps which are related to the study of information-seeking behavior about computer applications it is necessary to explain the differences among those types of information.

In general, the literature falls into at least two broad categories. Some studies attempt to determine the nature of the need while others attempt to distinguish between levels of perception. Information needs are those activities associated with and influenced by users in the application of any system. The "need to know" is the cognitive information needed which, when satisfied, creates understanding and the subsequent altering the one's state of knowledge.

Needs can be categorized as immediate or deferred on the basis of behavior. The former are directed toward satisfying a special problem, while the latter remain unconscious, hidden under layers of attitudes, impulses and values. Therefore, information acquired in response to them may never be put into action. Childers (1975) classifies those needs as kinetic and potential categories.

Information Gathering, can be defined as those activities in which stimuli are accepted and held in storage to be recalled on demand (Krikelas, 1983:9). They are activities that have become known as "keeping up with literature", or "current awareness". Information gathering, however, is not limited to simply remembering. Elaborate as well as relatively simple, personal filing systems have been developed as aids to the memory.

The other half of information gathering, is more casual and apparently completely lacking in direction. That interpretation may be a bit deceptive because a purpose does exist. It is an attempt to continually construct a cognitive environmental "map" to facilitate the need to cope with uncertainty.

Information giving is the act of disseminating messages in relation to the process of information-seeking. It can also be seen as part of a communication model. The messages may be communicated in written, verbal, visual or tactile form. Cummins (1984:63) indicates that question clarification or negotiations is the process of establishing the user's actual and specific information need as a result of interpersonal communication processes and agreement. He also emphasizes that the process is truly an information-sharing process, not just an encounter between two separate entities, but that which facilitate people's capacity to interpret their experiences throughout all communication.

The face-to-face communication between two people according to Cummins (1984) is only beginning to be investigated in terms of the dynamics of the process and its relation to the determination of users' needs, leading to ultimate satisfaction of those needs by the information system. Thus it follows in theory that the nature of information-seeking can be discerned indirectly from information gained from face-to-face communication and through question generation and formulation.

However, some information needs grow logically out of a previous need. Sometimes, the new situation means that the service is no longer needed or the changed situation may also alter the need. Krikelas (1983) concludes that individuals recognize uncertainty (that is, they have an information need) within a range of personal and job-related situations; they also may respond to some specific event. A decline in information need can be attributed to either a change in the situation or, more likely, the establishment of some information-giving service which satisfies the need.

Summers, Matheson and Conry (1983) found in their study of the interactive effect of personal attributes, information-seeking behavior and the use of information sources that indicate attitudes play a major role, as does staff job position and information dissemination habits. Therefore job position and attitude will affect users' opinions of information sources to varying degrees.

C. Computers in Higher Education

Computer technology has been incorporated into the educational systems to accommodate an evolving variety of innovative techniques and uses of information which apply to most of the administrative processes, research and instructional methods. Those techniques are available from different sources, different industries develop systems according to the various capacities of their computer. This makes a diversity of programs and systems available in the market and results in competition among them.

Unfortunately, the immediate demands of the market were fulfilled as soon as the systems came out, but policies and guidelines for growth had not been formulated. Every company in the computer industry wanted to improve the quality of their own system. In addition, companies oriented the product toward a special group of consumers.

This tendency was influenced by the use of technology in industries and business. There was a request for personnel with computer skills which could only be acquired in the computer industries and at the University level. Today, there are applications of computers in almost every field of education. The question arises as to how to orient the uses of computers in our educational systems in order to meet the demands of society.

In this respect Weizenbaum (1976:65) says:

> that whether the universally of computers implies that they can "do anything". This is really a question "Can anything we may wish to do be described in terms of effective procedure?" The answer to that question is "No". However, is clear that if we wish a machine to do something, we have to tell it to do it, and the machine must be able to understand what we say to it.

One does not need to be an expert in forecasting to understand the increased use of computer technology in the field of education. A number of demographic and social trends should further increase the future educational uses of computer technology. A population's changing information needs will be met in part with the flexibility and accessibility of computers.

Any thoughts concerning national information policies, issues and their interactions with education must consider Shain's (1982:3) point that:

- Any country is rapidly becoming an information society.
- The National Information Policy is a subject that warrants the attention of computer specialists.
- The issues of information policy should by necessity, be on the agenda of educational settings, even though education is still resistant to change.

Lipson (1981:7) gives his point of view about incrementalism which inhibits the invention of solutions needed to fully exploit the new information technologies. His perspective is that the computer has the potential to:

- Improve the quality of research.
- Enhance instruction in conventional college subjects (e.g. foreign languages).
- Enable us to teach new classes of knowledge and skills effectively and efficiently.

Also, he gives his forecast for the next five years:

> ...the difficulty with predicting future developments that will take place, comes from the way technological developments interact with each other to produce surprising combinations; the way that social, government and business decisions affect which developments are favored; and the way emerging technologies change our environment and our psychological horizons in unanticipated ways (Lipson, 1981:10).

It is virtually impossible to develop a planning process or even think about an institution's future direction without information. Information on the past and present conditions used to forecast future situations is an important component of any institutional planning activity. This does not mean that institutions having larger quantities of data, automatically have the information required to support a viable planning process.

In this respect Robinson (1982:7) points out that:

> ...the greatest challenge of information processing systems is the proper applicability of these technologies to the kind of problems that affect the way we live and our quality of life. They challenge us to learn how to apply the techniques to improve the human conditions in different ways.

The information resources must be directed toward satisfying the perceived needs of its intended users. The term Management Information System (MIS) is usually reserved for a set of fully integrated subsystems designed to provide consistent, accurate, relevant and timely information for management. Schoderbeck et al. cited in Hodgson and Chilvers (1982:27) reduce this definition to:

> ...MIS is an information network designed to provide the right information to the right person at the right time.

The fundamental definition of MIS is in the manipulation of data as a component of the decision-making or planning process. It must be analyzed and interpreted with reference to decision problems or policy issues. The Management Information System and the knowledge developed from working in the institutions should provide the planning staff with insight into the development of methods to allocate and reallocate resources. As well, these methods might greatly assist those who are making ultimate resource decisions.

Universities or institutions of higher education are a conglomerate of information systems, possessing functions for teaching, research, and administration which are oriented towards accomplishing community needs. Mohapeloa (1981:275) indicates that:

> ...Universities should develop programs, including sub-degree programmes, designed to meet manpower needs. Efforts should be directed toward developing non-formal education, the training of administrators, political leaders and toward simulating rural and cultural development.

Everyone assumes that the classroom, the teacher, the student, the book and printed word are universally recognized as part of the educative process. However, another force in the mainstream of our society is computer technology. The increasing use of technology will require more course offerings in the involved fields. Rapidly changing refinements will require frequent updating of knowledge.

The application of computers in higher education is an area of current interest. As Bent (1982:5) indicates:

> ...Education is one of the most expensive and pervasive activities in our society. If we identify "education" with "learning" then education can be seen to be an essential part of the way we live. Computers and their associated technology also perform an important role in our modern society.

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In addition, Petruk (1982:3) asserts that the current infusion of computers is now making it highly desirable, if not essential, for everyone to know something about computers in order to be able to function in society.

Today, universities and institutions of higher education are very aware of the use of computers. Efforts have been made to allow for accessibility of computers in those institutions. Computer technology and education regarding the state of knowledge is emerging. The rapid increase in the use of new technology shows considerable promise in its application to educational settings.

Unfortunately, literature published in computer technology tends to be out of date as a result of the remarkable rate at which computers are entering the classroom and the rapid development of the technology in the field of computers. However, the potential of computers in education has been well documented for more than a decade.

The tendency in our society today seems to be for the provision of the computer to students in their academic program in the hope that they will be able to exploit the potential of computers in their profession. Marvin et al (1980:500) mentions the potential and the limitation of computers in schools and the involvement of teachers. He emphasizes the benefits, not only for teachers, but for every person using the system in the school.

King (1983:345) says that computing capability must be provided, preferably in a manner that services the subunits of the organization and the organization as a whole. He also comments that most people are curious about computers and have a desire to experiment with them and use them, given the chance. Resistance to the use of computing processes seems to persist only as long as there is uncertainty about the impact of computer use on one's job and status within the organization.

Accordingly, colleges and universities are making individual administrators more responsible for computer applications. The most noticeable current trend is being accelerated by flexible user-friendly computer software (Wener, 1983:68).

However, this tendency is developing another movement in the application of computer resources. Information users can interact directly with one or more computer systems from remote terminals. In addition, they do not have to be computer programmers in the traditional sense because the proliferation of appropriate hardware and advances in "user-friendly" software make it possible for most individuals on campus to use computers effectively.

Also, the technological evolution in computer software has made preprogrammed packages more flexible and easier to implement in a variety of institutional environments. Therefore, those institutions with administrators who understand the new technological environment have greater opportunities and tend to be prepared to employ technology to improve the instruction, research and administration on campus.

In relation to this, Beering (1984:12) notes that:

> ...In the past campus computing was two-tiered in nature: a central campus facility, usually supporting terminal access, and individual microcomputers for use in data acquisition and experimental control.

In fact, managers of services in computing have confronted decisions about centralizing or decentralizing computing to determine an appropriate arrangement for the deployment of computer resources in their organizations. These decisions must consider user needs and the desire of management to control computer uses.

Centralization VS Decentralization

In the area of controversy concerning centralization versus decentralization of computing, King (1983) examines the long-standing debate over whether to centralize or decentralize computing in terms of the fundamental organizational and economic factors at stake. He suggests that the politics of organization and resources, centering on the issue of control are the factors which are of prime concern in the debate.

The definition of concepts about centralization and decentralization relies mainly on the concept of distance, although this depends on the point of view of the concerned party. It might be oriented toward the concentration of decision-making power, physical location of facilities, or the position of an activity or responsibility within the structure of the organization.

Robbins et al. (1975) say that there are three general schemes for providing independent computing operations whether they serve one or more institutions. These schemes are: (1) where no computing services are provided on the campus, but individuals have access to computing off campus; (2) where a centralized computing facility is used to meet all the needs; and (3) where there are decentralized computing facilities, each meeting the individual needs of different groups of users.

In addition King (1983) gives the pros and cons of the alternatives in centralization and decentralization of computing. He mentions that the most common arguments in favor of centralized computing have focused on location and function, that is, whether to centralize the services and/or facilities. The arguments favoring decentralization tended to focus, not on economics, but on improved computing service for users.

He concludes that:

> ...if computing activities were undertaken only to improve efficiency and effectiveness there would be no problem. But computing lures users for other reasons, not the least being its attractiveness as an exciting and potentially useful technology. Faith and delight in computing is a strong motivator for adoption, and often overcomes, the need for "demonstrated benefits" in the decision to adopt (King, 1983:333).

Certainly, trends for centralization and decentralization are developed according to the characteristics of every institution, therefore, researchers and theoreticians advocate their ideas and also give some general comments about the new tendency in our society. Most options are oriented toward decentralizing some functions when computational capabilities provided by small computers are available.

Heydinger and Norris (1979) confirm this in saying that any aspect of an information system can be decentralized including hardware, software, data bases or decision-making. The point is not to fully put aside central computing but to complement the systems where people can access and enhance the total resources of the institution.

Clark (1978) defines this relationship among users, minicomputers and the computer network. He explains the advantages of using a minicomputer and the interaction with large computers.

> ...The minicomputer and the large computer network is a perfect marriage because the mini offers an institution the ability to have low cost, responsive on-line capabilities while the network offers large computer power and considerable growth without being "locked-in" (Clark, 1978:7).

There will remain, of course, a number of cases where acquisition of a minicomputer or microcomputer to be used entirely on a stand-alone basis may be warranted, as well as a great many situations in which most user needs are met by existing central facilities (Nordby, 1978:6).

In support of Nordby's suggestion, Franz (1979) argues that even with decentralized computing there should be some functions that remain within a central unit. Services such as communication support, technical support and education which must be given to users in the institution should remain centralized.

According to Heydinger and Norris (1979), the push for decentralized systems comes from users that have substantial experience in computing and data management. However, new users or potential users may only require access to a small computer to satisfy their needs. Since those individuals are willing to use the system but lack experience, they look for advice from different sources and are oriented toward using small systems.

Every institution using computing facilities is oriented toward accomplishing needs that primarily concern organizational goals. The topic of centralization versus decentralization of computing may vary and can be assessed in particular situations. The main idea is to provide services which help to satisfy user needs whether using a central unit or microcomputers. What managers of computing must have in mind is the dual benefit of having one or both.

In this respect, Nordby (1978) mentions that users of microcomputers can be viewed as real customers for central facilities. That means that if the capabilities of small computers are restricted in performing certain tasks, the data or the information may be sent over communication lines to the larger computer for processing and storage for future use.

Accordingly, a typical computer system today may consist of microcomputers, minicomputers and computer network which permit users to access computer facilities in response to their needs. Whether there is centralization or decentralization of computing, managers of computer resources must take care of the distribution of services throughout the institution following policies and goals of the organization.

D. EDUCOM Activities

In 1984, Faculty Computer Literacy (F.C.L.) seminars had been done through EDUCOM with the participation of several universities from the United States and Canada (EDUCOM Project, 1984). The seminars are related to what has been done in each university with the use of the computer, what steps they have taken in order to better serve their users as these are considered in light of the trends in computer technology.

In a summary form the results of some of the university studies are reported in this section. The tendencies in most of those institutions is to increase the awareness of computer technology in an effort to arouse the interest of faculty members in the better use of the facilities offered in computing services.

1. American University

There were some suggestions for further training in faculty computer literacy. Among others they made recommendations as follows:

* To place in most of the departments computer terminals;

- To develop self-training materials on computers;
- To offer courses in computing science to faculty members in a low cost;
- To have workshops related to computers during saturdays;
- To organize faculty computer users group among the departments;
- To keep personal contact with "computer" faculties and other faculties interested in computing.

In order to accomplish those suggestions in that institutions, the senate curriculum committee has recommended as follows:

- To assess needs to help the faculties to set objectives;
- To make training accessible to all faculties;
- To provide a variety of learning opportunities.

Accordingly, this committee believed that "by increasing faculty awareness of the computer and its application, it was felt, those faculty members would incorporate the computer into their own teaching, research, and in turn, promote computer literacy among their students (EDUCOM unpublished paper, 1984).

2. University of Georgia

In a similar manner as the American University, guidelines for faculty and staff development activities were suggested for the accomplishment of the Faculty Computer Literacy program at this university. The computing committee on campus assessed the following list for the development of computer activities among faculty members:

- To establish institutional goals that set direction of computing at the University of Georgia;
- To obtain administrative and faculty commitment;
- To provide leadership in institutional policy matters;
- To insist on responsible planning;
- To maximize involvement and participation at the University of Georgia.

3. Hamilton College

The commission on computing at this college, regarding computing applications recommended that the college undertake a detailed study of its needs and to define the best computer system to meet them. The departments of the college need to address the issue of how they are going to make use of the computer, and then ensure that these uses become integrated into their departamental courses of study.

The commission believes that it is important for the college to make an statement about the importance of computing and to incorporate such a statement in published materials. This commission concluded that there would be support for those faculties who wish to attend seminars, workshops on the uses of computers in their respective disciplines. In addition, there will be appointed a standing committee advisory to the president and composed of faculty, administration, staff and students to deal with policy questions regarding computers and information systems which affect the campus community.

4. College of New Rochelle

As at the Hamilton College, seminars were conducted and the committee responsible for computing at New Rochelle concluded with recommendations for the best use of computers on campus. The first recommendation was to define the policy guiding academic computing at the college. The second recommendation and most important was deciding how to address the academic computing needs of the college with respect to the administrative computing realities.

5. Peperdine University

This university and the group of people who assisted in the faculty computer literacy program, came out with some ideas which may help in the implementation of this program in their university. They were as follows:

* To obtain the support and leadership of top administration in the institution;
* To provide a microcomputer purchase plan for faculty and staff with appropriate software and hardware;
* To train faculty members through user peer group members;
* To work closely with hardware and software vendors.

6. University Of Waterloo

The members who participated in the faculty computer literacy program, came to the following conclusions:

* To increase courses using the computer in all

faculties at the University of Waterloo.

- To give priorities to systems supporting the university objectives;
- To encourage the use of the systems available at the University of Waterloo;
- To help users to learn the use of the computers.

In conclusion, accross the reporting institutions, several themes seem to be apparent. First, high level administrative approval and involvement should be secured and maintained as institution policy making relevant to computers shifts and changes. Second, a formal needs assessment with heavy involvement of the academic departments was seen as a fruitfull point of beginning. Third, the institutions wished to encourage the use of appropriate computing systems in their teaching function and saw that increasing staff knowledge was a key to this endeavor.

E. The Evaluation Process

Evaluation is not a new concept. One dictionary definition of evaluation is "to determine the worth of, to appraise". However, definitions of evaluation are varied. Worthen and Sanders (1973) argue that evaluation must include judgements about the worth of the program, product or process being evaluated. Many contemporary writers on evaluation use the term more loosely to include the very activities which they opted to exclude from their definition. These activities are: describing programs, collecting and reporting information or monitoring programs.

Dunn (1981:59) defines evaluation in his book as follows: the policy-analytic method used to produce information about the value or worth of past and/or future courses of action. In this definition, the term evaluation and its commonalities with other processes is synonymous with appraisal, rating and assessment. It is a word which implies efforts to analyze process or product of some set of values.

One could look at whether the evaluation process is focused on product or process. Each classification has some use in relating the existing models, recipies and practices. The mixture of activities in which a particular evaluator is engaged will, of course, be influenced by resources of time, money expertise, goodwill and other factors.

In the educational system, Taba and Sawin (1962) propose a model of evaluation which concentrates on the collection of information which would determine why students fail to achieve stated objectives. Information to be collected includes observations on teaching methods, patterns of classroom interaction, physical facilities, and students abilities and motivations.

In this respect Dunn (1981) agrees that evaluation provides reliable and valid information about the extent to which needs, values and opportunities have been realized through public action. It helps make practical inferences about how problems have been resolved. In addition, Dunn asserts that evaluation contributes to the clarification and critique of values that underlie the selection of goals and objectives of the process. Evaluation can also contribute to the definition of new alternatives.

There are at least three different schools of thought in education about how evaluation should be defined. These theories have co-existed for at least thirty years (Worthen and Sanders, 1973). However, new definitions have emerged, for example: Stake's model (1967), Provus' model (1969) and Stufflebeam's model (1968).

Stake's model (1967) is focused on the data of evaluation. One dimension separates the data into descriptions and judgements. On the other dimension, data are classed as antecedent, transaction or outcome. Antecendent data are descriptions and judgements collected on conditions prior to the process or program. Transactions are descriptions and judgements of the activities that occur as the process or program is carried out. Outcome data refers to the results of the process or program. Stake concludes that evaluation consists of determining the degree of relationship and agreement among the various classes of data.

In Provus' model (1969) evaluation essentially consists of (1) agreeing upon program standards, (2) determining whether a discrepancy exists between the standards and the program, and (3) using the discrepancy information to correct weaknesses in the program. The process of evaluation consists of moving through the four stages (definition, installation, process and product) and through three major content categories: Input, Processes, and Outcomes.

In Stufflebeam's model (1968), evaluation is defined as the process of acquiring and using information for decision-making, associated with planning, programming implementing and recycling program activities. His model is called the CIPP model because of the four stages of evaluation that he describes. The first stage is Content Evaluation, which is to identify and assess needs and to identify problems underlying the needs. The second stage is Input Evaluation in which the evaluator assesses system capabilities, available input strategies, and designs for implementing strategies. The third stage is Process Evaluation where the goal is to identify and predict the defects in the design or its implementation in process. The final stage is Product Evaluation in which the goal is to relate outcomes to objectives and to context, input, and process information.

To some extent the same interrelationships exist among all models of evaluation. House (1980) makes a comparison of various models of evaluation in which he emphasizes the theoretical assumptions upon which the models are based. The Provus' model (1969) includes a multi-page matrix of the way various authors view different aspects of the evaluation process. The list of considerations is not an exhaustive one but it is representative for the purpose of comparing evaluation models. Both tables provide the characteristics and methodologies among other components of the models and give one the idea for which each applies, according to the type of process or concensus of goals.

> "Evaluators should evaluate" is a value of judgement itself but it also happens to be a tautology. So forget the idea that evaluations are a matter of opinion or taste. They are matters of facts and logic and more important than most (Scriven, 1969:22).

It may be assumed that evaluation plays a role in decision-making, administration, education, law and elsewhere, but whatever its role, the goals of evaluation are the same, to estimate the merit, the worth or value of the thing being evaluated.

F. The Communication Effectiveness Criteria and Computing Services

The title of the study is: "Communication Needs and Computer Utilization at the University of Alberta". In order to understand the term effectiveness of communication the next paragraphs review the literature discussing the criteria of effectiveness.

Research studies reveal many situations in organizations where human behavior is generally predictable and recurrent. Theory from the social sciences is a useful guide for the consideration of those terms related to human behavior and predictable patterns.

Despite the popularity of the concept of effectiveness in theories of organization and management, there is no concensus about its meaning. Most organizations have their own varying conceptions of effectiveness which may change over time. In addition, even when comparable concepts are available, usually they are measured and assigned differently by each organization.

Campbell (1977) cited in Hasenfeld (1983:206) gives the definition of effectiveness as "the degree to which the organization is achieving its goals". Some studies have sought to identify indicators of organizational effectiveness by surveying a large number of administrators. These studies show that the more effective organizations have the following characteristics: (1) use and develop their human resources effectively; (2) have good planning; (3) emphasize task accomplishment; (4) constantly initiate improvements in their operations; and (5) have cooperation among organizational units.

Similar to the above results, Kelly (1980:406) points out useful criteria for measuring organizational effectiveness. He breaks these components into four categories: (1) Task effectiveness; (2) Human relations effectiveness; (3) Adaptation effectiveness; and (4) Intelligence effectiveness. In addition, Schein (1977) emphasizes that the major components of a human resource, planning and development system, should be coordinated for maximum effectiveness.

Scott (1981) on the other hand, says that to inquire into effectiveness is to ask how well an organization is doing according to some set of standards, taking into account the specific goals of the organization as the basis for generating effectiveness criteria. Therefore, effectiveness of an organization depends upon obtaining congruence among the environment, structure, people and process. Increasing the level of harmony among these factors increases the level of effectiveness of an organization.

However, Hoy and Miskel (1978:12) quote Simon who says that: "There is no best solution to any given problem, but some solutions are more satisfactory than others". From this one can say that while theory suggests possible solutions which may be useful in the guiding of administrative processes, the actual outcome of any situation depends on the characteristics and perceptions of the administrator performing the job and how well the particular theory applies.

From the apparent need described in the literature, it appears that more research is required in the area of computer applications in institutions of higher education. In line with this tendency and the advent of the information explosion alluded to in the literature, this study attempts to realistically examine how a university responds to the ever increasing demands for computer applications. Wedded to the problem of supplying information to those users who need it quickly and in ever-increasing quantities, the present study developed a questionnaire for surveying personal attributes of users. These are measured by variables such as attitude toward collecting the information and a sense of importance attached to computers as information sources.

The information gathered on user attributes is an attempt to aid managers and policy makers in their decision-making processes and help computer application designers in developing better information products and services for user groups.

The methodolgy is designed to yield evidence of a trend or a consistent behavior pattern in question generation for a defined problem situation regarding the use of computer systems. This study considers the type of users employing computer resources at the University.

Consistent with the literature on evaluation, in this study the evaluation process appeared only during the first stage of research which was the collection of information relative to a specific need. Accordingly, the methodology employed was closer to Stufflebeam's model (1968) of surveys, questionnaires and interviews. These take into consideration the present situation and possible future changes in users' needs.

The stage referred to above is the collection of data regarding judgements and descriptions that occur as the information seeking process is carried out.

The criteria for data collection follows the general goals or objectives of the university offering computing resources to users. The implications of the results obtained may suggest new plans, programs and the implementation of new activities which may improve the quality of the services and information. In addition this information may help managers in decision-making for the allocation of resources to accomplish required needs and/or to correct weaknesses in the system.

G. Summary

This chapter presents a summary of literature related to the topics relevant to the study. It discusses higher education in general and specifically universities and colleges. The first part of the chapter indicates that it is necessary for colleges and universities to develop needs assessment to help satisfy the desired conditions or solutions regarding the use of computer resources. It also indicates that research among departments on needs assessment in educational institutions is necessary to determine the specific nature and perceived needs from the point of view of the user.

The literature on information-seeking behavior is oriented toward determining if the perceived need is fully defined and realistic. Researchers identify different types of information which may help in the survey of how personal attributes and attitudes are related to the satisfaction of a particular need. This information emerges as an attempt to conceptualize which variables will aid managers and policy makers to develop better information products for user groups regarding computer resources.

Present knowledge concerning the use of computing facilities in educational organizations is included in this chapter. In addition to the discussion of centralization and decentralization, this chapter emphasizes the provision of services in computing which permit users to access the computer facilities. The distribution of those services is the responsibility of the managers and administrators of both the computer services and the university.

A brief overview of the evaluation process is developed for the purpose of obtaining a theoretical framework. The study is not oriented toward performing an evaluation process, but part of the process is covered, especially by the methodology used for the collection of the information through questionnaires and interviews.

The chapter ends with a discussion of literature related to the criteria for effective communication. Although, this literature is not extensive, it provides background information useful for understanding the setting of the study.

Chapter III

RESEARCH METHODOLOGY

This study is designed to ascertain the perception of academic staff and faculty members of the University of Alberta regarding the use of the services being offered in computer applications. The following are discussed in the research methodology: (A) research design; (B) population and sample; (C) data source and instruments; (D) data analysis and reporting.

A. Research Design

This is a descriptive study based on both quantitative and qualitative data gathered at the University of Alberta. Thus the study is intended to describe the perception of users' needs regarding the access to computer services at the University of Alberta. It also is intended to identify general needs or expressed needs of those using the computer resources, which will assist in an assessment of the effectiveness, from the user's point of view, of services offered at the University.

The study design includes a cross-sectional sample of the academic staff at the University of Alberta. The data was collected through a survey questionnaire, a semi-structured interview, and information collected through the Planning Group II questionnaire.

B. The Population and Sample

Full-time faculty members of the University of Alberta were chosen as the target population of this study. In order to select the sample for the study, each department was appraised upon the following:

1. Classification of departments on campus according to three different purposes of computer applications: (a) scientific computing; (b) social science application; (c) applications different from the previous two.
2. From the results of Planning Group II questionnaire, the departments with higher anticipated growth in computer applications were identified and classified by the type of computing application.
3. Actual amount of total expenditure of computer time used on the Amdahl/MTS system and the proportion of accounts assigned for each department on campus.

The determination of the sample for the study was based upon the comparison on the three dimensions. Three different categories were chosen for stratifying the sample. These categories are based upon the purposes of computer applications in the University environment. The terms used for the classification of computing were defined in general form to differentiate the type of categories as follows:

a. Scientific application of computing.

The computer is used for various scientific and research problem solving questions or programs as well as many non-business uses. Such programs are characterized by a low volume of input-output and high computer power. Some examples of this category are: computation of numerical results; comparison of theory and experimentation; simulation for design; and simulation for prediction.

b. Social Science application of computing.

This category is oriented toward using the computer for gathering data and storage of the information on a data basis. Particularly in this area of application the data are used in: analysis of surveys; analysis of demographic data; simulations on analysis of personal belief systems; and library information.

c. Other applications of computing.

This category includes most of the applications not mentioned in the previous two categories, especially those applications related to: computer science; computer architecture; programming; operations; arts applications; humanities applications; econometric applications; medical applications; political applications; engineering applications; and administrative applications.

The sample of departments on campus were selected using the definitions developed by this study for Scientific Computing, Social Science Computing and Other Type of Computing. Table 3.1 indicates examples of the departments which fall into each of the three categories.

Table 3.1
Departments by Application of Computing.

APPLICATION	DEPARTMENT
Scientific Computing	Chemical Engineering Physics Mineral Engineering Linguistics Biological Sciences
Social Science Computing	Sociology Educational Administration Educational Psychology Secondary Education Elementary Education Library Science
Other Computing	Computing Science Economics Business Administration Health Services Adm. Law

When considering the anticipated growth in computer applications (second dimension) several departments were identified according to the three categories of computing applications. The results of Planning Group II were used from the total sample of 1083 responses after the questionnaire return. The information is arranged by the three categories of applications responded to by the departments, taking into consideration the number of staff members who indicated that some or several computer applications will be needed in the department during the next three years. The total number of applications from those results were 40. The results are shown in Table 3.2 in this section.

Table 3.2
Anticipated Growth of Computer Applications
Taken from Planning Group II Questionnaire

DEPARTMENT	STAFF NUMBER RESP.	NUMBER OF APP.	RATIO
Chemical Engineering	15	250	.4167(H)
Physics	33	251	.1902(L)
Mineral Engineering	7	69	.2464(H)
Linguistics	5	33	.1650(L)
Biological Sciences	1	11	.2750(H)
Sociology	26	249	.2394(H)
Ed. Administration	13	146	.2808(H)
Ed. Psychology	16	171	.2672(H)
Secondary Education	11	90	.2045(L)
Elementary Education	11	143	.3205(H)
Library Science	6	80	.3333(H)
Computing Science	23	240	.2609(H)
Economics	19	139	.1829(L)
Business Adm.	36	389	.2701(H)
Health Services Adm.	3	28	.2333(L)
Law	10	102	.2550(H)

RATIO=# OF APP. RESPONDED/(TOTAL APP. * #STAFF RESPONDING)

The letters used within brackets (H, L) on the Table 3.2 indicate for each category, the departments which represent their priorities with high or low anticipated growth of computer applications. In order to be consistent in the breaking point for these values, two values were considered as high and low regarding the ratio of the responses. High value (H) is from 0.2350 and up, whereas low value (L) is from 0.0 up to 0.2349 .

Data for use in the last dimension was obtained from the 1983/1984 annual report of the Department of Computing Services. The information was classified by department categories. The information for the total expenditure was as indicated in Table 3.3 . The H and L letters appearing in brackets on the table indicate for each group the departments which represent their expenses as high or low in computing facilities on campus. High value (H) is from $100,000.00 and up whereas low value (L) is from $0.0 up to $99,999.99

Table 3.3
Total Expenditure in Computing Facilities
Taken from Annual Report 1983/1984

DEPARTMENT	EXPENDITURE($)
Chemical Engineering	187,803(H)
Physics	331,943(H)
Mineral Engineering	110,631(H)
Linguistics	11,941(L)
Biological Sciences	532(L)
Sociology	101,691(H)
Ed. Administration	57,214(L)
Ed. Psychology	45,348(L)
Secondary Ed	10,183(L)
Elemetary Ed.	5,152(L)
Library Sc.	8,307(L)
Computing Science	1,001,741(H)
Economics	35,335(L)
Business Adm.	212,079(H)
Health Services Adm.	11,623(L)
Law	21,029(L)

The cumulative usage by departments during the 1983 fiscal year for the MTS system was obtained from the Computing Services Department. This report includes several forms of information such as charges for the following: input/output to the disk; connected terminal time; CPU time; etc. For the purpose of selecting the sample, consideration was given only to the CPU time the terminal was connected to the MTS, and to the category of computing applications by departments as shown in Table 3.1 . The information is listed in Table 3.4 .

Table 3.4
Cumulative MTS usage as of January 1984
Computing Services Information

DEPARTMENT	CPU CONNECTED HOURS
Chemical Engineering	51.6(H)
Physics	124.5(H)
Mineral Engineering	26.3(H)
Linguistics	1.7(L)
Biological Sciences	6.6(M)
Sociology	15.1(H)
Educational Administration	7.7(M)
Educational Psychology	4.9(M)
Secondary Education	1.3(L)
Elementary Education	0.6(L)
Library Science	1.1(L)
Computing Science	232.6(H)
Economics	6.2(M)
Business Adm.	36.4(H)
Health Services Adm.	2.2(L)
Law	3.3(M)

The H, M, and L letters appearing in brackets on the table indicate for each group the departments which represent their use as high medium or low in the MTS system on campus. High value (H) is from 15 hrs and up while medium value (M) is from 3 hrs up to 14.9 hrs, and low value (L) is from 0 hrs up to 2.9 hrs.

Based on those dimensions the departments of the sample were then characterized as high and low intensity users. High intensity users were the members of those departments which use the computer and each member use a relatively extensive amount of computer time. On the other hand, low intensity users were the members of those departments which use the computer and each member uses a small amount of computer time.

Two departments within each category of computing applications were selected for the administration of a questionnaire which was specifically designed for this study.

Consideration of the information from the four tables (Table 3.1 through Table 3.4) and the type of users lead to choice of the departments for the sample. These departments are reported in Table 3.5 .

Table 3.5
Selected Sample

INTENSITY OF USE	SCIENTIFIC COMPUTING	SOCIAL SC COMPUTING	OTHER COMPUTING
High	Chemical Engineering	Sociology	Computing Science
Low	Linguistics	Secondary Education	Health Services Adm.

The sample of six departments were selected and surveyed through the questionnaire which collected information from the members of the academic staff in each department at the University. A copy of the questionnaire is attached as Appendix A.

In order to obtain permission for the administration of the questionnaire, the researcher spoke to the Chairman of each selected department. Further, the chairmen were asked to support the study through distribution and collection of questionnaires as well as in assistance in the selection of individual users for the interview. In the event that any of the departments selected were unable to administer the questionnaire, the selection of other(s) department(s) followed. The same procedure for the selection of new departments considered the next level of classification according to the three dimensions specified for the first sample. The new department(s) were those which were closest to the previous selected sample in the required categories.

The selection of the final sample was as follows in Table 3.6 .

Table 3.6
Final Sample

INTENSITY OF USE	SCIENTIFIC COMPUTING	SOCIAL SC COMPUTING	OTHER COMPUTING
High	Chemical Engineering	Sociology	Computing Science
Low	Linguistics	Educational Psychology	Health Services Adm.

The reason the department of Secondary Education declined to be a part of the sample (see Table 3.5), was a result of the Chairman of the department entering retirment and the transfer of the position would have made it more difficult to administer the questionnaire. Therefore, the next closest department which met the characteristics of this category, was Educational Psychology, which in fact, allowed the administration of the questionnaire. The five other departments in the original sample agreed to participate and provided the needed assistance.

C. Data Sources and Instruments

Three main sources of data were utilized for the data collection: survey questionnaire, semi-structured interviews and analysis of the Planning Group II questionnaire.

The main instrument was the survey questionnaire to which the selected sample of departments responded. The semi-structured interview had two main purposes: to confirm some of the data obtained from the survey questionnaire and to seek additional information. The analysis of the Planning Group II questionnaire and the results of the semi-structured interviews contributed factual information as well as confirmed the data gathered in the survey.

The survey questionnaire consisted of three main sections. **Section** I was aimed at gathering essential information about current computer applications from departments. Classifications were established for the main computer systems the departments may have had access to and for the software currently being used with the system(s).

Section II sought responses to a number of items that were related to interests of staff and faculty members relevant to the use of computer resources. There were 15 items in that section. For some of the items of the questionnaire respondents were asked to indicate on a one to five point scale their perception of the importance of the item as it applied to them.

The numbers on the scale corresponded to the following levels of perceived need:

1=no need, 2=limited need, 3=moderate need, 4=considerable need, 5=essential need.

Finally, Section III probed the extent to which the staff and faculty members were familiar with the information and advisory services of the different computer services. There were 26 items divided into three parts: (1) main computer systems MTS, OAS, PLATO; (2) other computer systems, including Mini/Micro computers; and (3) general aspects about services in computing.

For each item in the first part of the third section, respondents were asked to identify the system they used. In the second and third parts some questions were responded to on a YES - NO basis and indicated the feelings of the respondents about services in computing.

Two open-ended questions were included at the end of the questionnaire for the purpose of gathering extra comments about the use of services and recurring problems concerning computer resources. At the end of the questionnaire, the respondents were asked to check if they would or would not be willing to participate in a follow-up interview.

In creating the questionnaire for the study, some of the questions were modeled so as to be similar to those used in studies reported at the EDUCOM seminars on the topic of "Faculty Computer Literacy". The questions were modified and adapted to provide information most consistent with the focus of this study.

Content validity was established through the review of the questions by the thesis committee and a panel of doctoral students. The reliability of the questionnaire tended to be confirmed through the responses from the interviews. The consistency of the interview answers and questionnaire results proved this assurance of reliability.

D. Data Analysis

The analysis of the data relied mostly on descriptive statistics and analysis of variance. Descriptive statistics included frequency distribution, means, standard deviation, and percentages. In order to find out the relationship between present and future needs of computing services, a correlated T-TEST was used.

The degree of importance as perceived by the staff was assessed by considering the numerical values of the means and standard deviations calculated for variables identified in Section II of the survey questionnaire. The characteristics of the computer facilities were measured by the numerical values of the means and standard deviations calculated from staff responses to the items in Section III of the questionnaire.

A two-way analysis of variance was used with response to Section II of the questionnaire. This technique was used to compare the responses by department types, high and low intensity use of computer application and to examine the impact of the interaction between those two main dimensions.

Because this is a descriptive study and therefore does not use hypothesis testing, the analysis of the information will only serve to assist in the interpretation of the results. The findings will be indicative and not definitive. This is in part due to the small number of respondents in the Department of Health Services Administration. Therefore the reader is at liberty to determine if the probabilities reported for each item are meaningful.

E. Summary

In this chapter, the design and development of the instrument used for data collection, the characteristics of the population, the sampling selection of academic departments, and the procedures of data collection and treatment were described.

The instrument used was a questionnaire asking: the actual and future needs of computer applications; information of type and amount of resources users receive at the University; and, the kind of problems users encounter in using computing facilities.

The sample for this study was selected on the basis of the different type of applications of computers, actual amount of computer usage, and the anticipated growth in computer application from a list of the departments who were using any computing service. A sample of six departments was selected and surveyed through the questionnaire, which collected data from all full-time faculty members in each department.

Of 159 questionnaires administered in the six departments selected, 79 (50%) returned questionnaires were usable. The data from the questionnaires were examined, coded and transferred to the computer for analysis, using statistical procedures to calculate frequency distribution, means, standard deviation and percentages.

Chapter IV

THE FINDINGS OF THE STUDY

In this chapter, the results of the data analysis are reported. The respondents answers develop and profiles which describe characteristics of the departments in terms of type of computer application, type of users of any available computer system at the University of Alberta. Users and potential users of the systems provided on campus were approached. The chapter is divided in two sections: (1) findings of the questionnaire designed for the survey, and of the semi-structured interview used as a follow-up to the questionnaire survey; (2) findings of the Planning Group II survey, using their compiled information from the results in the questionaire they applied on the campus.

Following the profile of the respondents, the findings relative to the current needs for computer applications, and the familiarity of the respondents with computer facilities are discussed. The data analysis addresses each of the subquestions outlined in Chapter I. A summary of the findings is presented at the end of the chapter.

A. Questionnaire and Interview

The data for this study were provided by 79 respondents answering the questionnaire. The responses were received from the population of full-time faculty members of the selected departments at the University of Alberta. The rationale for the selection of the sample was discussed in detail in Chapter III.

The tables 4.1, 4.2 and 4.3 indicate the total sample of the individual staff survey, the number of questionnaires that were distributed and the return rate for each department selected.

Table 4.1
First Group of Questionnaires Administered
and Returned By April 30, 1985

DEPARTMENTS	# Q. SENT	# Q. BACK	RESPONSE RATE
Chemical Engineering	16	15	94%
Linguistics	9	5	56%
Sociology	41	17	41%
Health Serv. Admin.	4	4	100%
Computing Science	44	11	25%
Educational Psych.	45	12	24%
TOTAL	159	64	40%

Table 4.2
Second Group of Questionnaires Administered
and Returned By May 15, 1985

DEPARTMENTS	# Q. SENT	# Q. BACK	RESPONSE RATE
Chemical Engineering	*	*	*
Linguistics	4	2	50%
Sociology	38	0	0%
Health Serv. Admin.	*	*	*
Computing Science	33	8	24%
Educational Psych.	33	3	10%
TOTAL	108	13	11%

* The departments where the initial response was more than 90% were not administered a second wave of questionnaires and therefore an asterisk appears in those columns.

Table 4.3
Total # of Questionnaires Administered

DEPARTMENTS	# Q. SENT	# Q. BACK	RESPONSE RATE
Chemical Engineering	16	15	94%
Linguistics	9	7	77%
Sociology	41	17	41%
Health Serv. Admin.	4	4	100%
Computing Science	44	19	43%
Educational Psych.	45	15	33%
TOTAL	159	79	50%

Some interesting findings were revealed by the analysis of the questionnaire administered to the full-time faculty members from selected departments at the University of Alberta. Following the format of the research questions formulated in the purpose of the study, the findings are reported in a sequential form and attempt to answer the questions regarding the perception and understanding of computer applications on campus from the user's point of view.

The findings relative to the perceptions of the total sample (N=79) regarding seventeen items of needs for computer applications at the present and in one year from now are presented in the following manner.

As identified earlier in the section describing the sample, departments on campus were classified according to three different purposes of computing application (Scientific Computing, Social Science Computing, and Other type of Computing different from the other two). For each of these three classifications, the findings are presented as: degree of need, categorization of degree of need, items of high and low need.

Mean scores (Mean) were used to determine the degree of need for the three classifications of computer applications. In order to compare the degree of reported need among the items, the items were ranked by mean scores from the highest to the lowest. The highest mean score suggests the highest degree of perceived need, while the lowest mean score suggests the lowest degree of perceived need. The perception of needs for information about computer application were categorized according to approximate quartiles based on the ranking of the items.

The first group consisted of items, the rank of which placed the item in the 25% of perceived needs by department, for all respondents and for immediate use as well as for a need perceived to exists one year in the future. The other category represented the items that were perceived to be of low need, by departments for all respondents and for the present as weell as the future. The items in the top quartile are seen to represent highest priorities for action and those in lowest quartile represent activities that may be curtailed. Therefore this section of the report deals with item grouping of perceived need.

1. What do the users perceive they actually need to know about computer applications?

All Respondents. The mean and the rank order of the items of present need for computer applications perceived by the total of the respondents are presented in Table 6.7 Appendix C. In Appendix C the results are organized in terms of the item the number of respondents for each item, and the mean score (Mean) and rank (Rank) at the present time.

The table in Appendix C shows an average mean score (2.75) of the importance of perceived need across all the items. This indicates a moderate degree of need. Table 4.4 exhibits the manner in which the items were grouped. There were four items categorized as high need (3.16-3.72), four items as fairly high need (2.86-3.09), five items as moderate need (2.40-2.74), and four items as low need (2.02-2.21).

Table 4.4
Degree of Need Perceived By
All Respondents

DEGREE OF NEED	MEAN RANGE	NUMBER	RANGE OF RANKS
High	3.16-3.72	4	1-4
Fairly High	2.86-3.09	4	5-8
Moderate	2.40-2.74	5	9-13
Low	2.02-2.21	4	14-17

The needs perceived by the respondents as the greatest at the present time are indicated in Table 4.5 .

Table 4.5
Items Receiving a Great Need By
All Respondents At Present

ITEM	NEED TO	MEAN	RANK
4.	Learn to use the computer for research.	3.72	1
17.	Be aware of compatibility of microcomputers and computers.	3.65	2
1.	Acquire knowledge of computer applications.	3.35	3
2.	Acquire knowledge of computers resources.	3.16	4

Scientific Computing. The mean score and rank order of the items of information needs for computer applications perceived by this type of computer application is presented in Table 6.4 Appendix C.

The table shows an average mean score of 2.76 for all the items which indicates a fairly high degree of need. Table 4.6 exhibits the manner in which the items were grouped. There were five items categorized as high need (3.14-3.80), four items as fairly high need (2.73-3.09), four items as moderate need (2.31-2.68), and four items as low need (1.73-2.00).

Table 4.6
Degree of Need Perceived By
Scientific Computing Users

DEGREE OF NEED	MEAN RANGE	NUMBER	RANGE OF RANKS
High	3.14-3.80	5	1-5
Fairly High	2.73-3.09	4	6-9
Moderate	2.33-2.68	4	10-13
Low	1.73-2.31	4	14-17

Five items which were categorized as having a great need are listed in Table 4.7 . The item which had the highest mean score (3.80) was to learn to use the computer for research. It was followed by the item referring to the need to be aware of compatibility among microcomputers and computers (3.63), and to acquire knowledge of computer application (3.45).

Information gathered in the interviews suggested that the users of this type of computer application perceived their needs to be more oriented toward the documentation of the computer systems at the present time. They indicated that:

- Documentation of computer systems should contain more examples of the use of different packages in the computer systems.
- There should be a network capable of accessing the different mainframe systems with one terminal.

Table 4.7
Items Receiving a Great Need By
Scientific Computing Users At Present

ITEM	NEED TO	MEAN	RANK
4.	Learn to use the computer for research	3.80	1
17.	Be aware of compatibility among micro/computers.	3.63	2
1.	Acquire knowledge of computer applications.	3.45	3
2.	Acquire knowledge of computer resources.	3.27	4
5.	Learn to use the computer for teaching.	3.14	5

Social Science Computing. In this classification the mean and rank order of the items of present need for computer applications perceived by social science computing is presented in Table 6.5 Appendix C.

The table shows an average mean score of 2.69 for all the items which indicates a fairly high degree of need. Table 4.8 exhibits the manner in which the items were grouped. There were four items categorized as high need (3.22-3.69), five items as fairly high need (2.86-3.16), four items as moderate need (2.28-2.61), and four items as low need (1.57-2.12).

Table 4.8
Degree of Need Perceived By
Social Science Computing Users

DEGREE OF NEED	MEAN RANGE	NUMBER	RANGE OF RANKS
High	3.22-3.69	4	1-4
Fairly High	2.86-3.16	5	5-9
Moderate	2.28-2.61	4	10-13
Low	1.57-2.12	4	14-17

Four items which were categorized as having a great need are listed in Table 4.9 . The item which had the highest mean score (3.69) was to be aware of compatibility among Microcomputers and Computers. It was followed by the item referring to learn the use of the computer for research (3.57), and to know where to obtain support and trouble shooting help about computer systems on campus (3.39).

Table 4.9
Items Receiving a Great Need By
Social Science Computing Users At Present

ITEM	NEED TO	MEAN	RANK
17.	Be aware of compatibility among micro/computers.	3.69	1
4.	Learn to use the computer for research.	3.57	2
7.	Know where to obtain advice regarding computer services on campus.	3.39	3
2.	Acquire knowledge of computer resources.	3.22	4

Information obtained through the interviews concerning the perceived need for Social Science Computing indicates the following perceived needs:

- More information regarding what is available on the existent systems on campus.
- Guidelines for how to develop a computer user environment between the computer services and the departments.
- A more efficient exchange of information about the interaction of microcomputers and the mainframe.

Other Type Of Computing. The mean and the rank order of the items of present need for computer applications perceived for this group is presented in Table 6.6 Appendix C.

The table shows an average mean score of 2.83 for all the items which indicates a fairly high degree of need. Table 4.10 exhibits the manner in which the items were grouped. There were five items categorized as high need

(3.26-3.91), four items as fairly high need (2.66-3.13), four items as moderate need (2.47-2.59), and four items as low need (2.08-2.41).

Table 4.10
Degree of Need Perceived By
Users of Other Type of Computing

DEGREE OF NEED	MEAN RANGE	NUMBER	RANGE OF RANKS
High	3.26-3.91	5	1-5
Fairly High	2.66-3.13	4	6-9
Moderate	2.47-2.59	4	10-13
Low	2.08-2.41	4	14-17

Five items which were categorized as having a great need are listed in Table 4.11 .

In the interviews individuals employing this type of computing application were concerned with matching the characteristics of the main systems and the users' goals. They perceived the following needs:

- Better communication between the computer services and the departments regarding their needs.
- Seminars or workshops provided by the Department of Computing Services to talk about the needs of the department involved.
- Network capabilities to access the mainframes through microcomputers.
- Better interface between the UNIX system (Computing Science) and the MTS system.

Table 4.11
Items Receiving a Great Need By Users of Other Type of Computing At Present

ITEM	NEED TO	MEAN	RANK
4.	Learn to use the computer for research.	3.91	1
1.	Acquire knowledge of computer applications.	3.70	2
17.	Be aware of compatibility of microcomputers and computers.	3.58	3
16.	Acquire documentation of major packages for computers.	3.30	4
5.	Learn to use the computer for teaching.	3.26	5

2. What do the users perceive their computing needs to be in one year from now?

All Respondents. In Appendix C, Table 6.7 the mean and the rank order of the items perceived by the total respondents regarding future needs of computer applications are indicated. In Appendix C, the results are organized in terms of the item, the number of respondents for each item, and the mean score (Mean) and rank (Rank) in one year from now. The average mean score of 2.85 for all the items indicates close to a fairly high need. The manner in which the items were grouped are shown in Table 4.12 .

Table 4.12
Degree of Need Perceived By
All Respondents In One Year From Now

DEGREE OF NEED	MEAN RANGE	NUMBER	RANGE OF RANKS
High	3.24-3.91	5	1-5
Fairly High	2.93-3.19	4	6-9
Moderate	2.44-2.57	4	10-13
Low	2.01-2.33	4	14-17

The needs perceived by the respondents as having a great need in one year from now are indicated in Table 4.13 .

Table 4.13
Items Receiving a Great Need By All Respondents
in One Year From Now

ITEM	NEED TO	MEAN	RANK
17.	Be aware of compatibility of microcomputers and computers.	3.91	1
4.	Learn the use of computer for research.	3.82	2
1.	Acquire knowledge of computer applications.	3.48	3
14.	Learn where to obtain support and help regarding computers.	3.26	4
5.	Learn to use the computer for teaching.	3.24	5

Scientific Computing. The data collected regarding the perceived needs of Scientific Computing users in one year from now is presented in Table 6.4 Appendix C in conjuction with the actual need at the present time.

The table shows an average mean score of 2.88 for all the items, which indicates close to a fairly high degree of need. Table 4.14 exhibits the manner in which the items were grouped. There were four items categorized as high need (3.24-3.91), five items as fairly high need (2.93-3.18), four items as moderate need (2.44-2.55), and four items as low need (2.01-2.33). Four items which were categorized as having a great need are listed in Table 4.15 .

Table 4.14
Degree of Need Perceived By
Scientific Computing Users In One Year

DEGREE OF NEED	MEAN RANGE	NUMBER	RANGE OF RANKS
High	3.32-3.95	4	1-4
Fairly High	3.04-3.22	5	5-9
Moderate	2.36-3.00	4	10-13
Low	1.84-2.22	4	14-17

Table 4.15
Items Receiving a Great Need By Scientific
Computing Users in One Year From Now

ITEM	NEED TO	MEAN	RANK
17.	Be aware of compatibility among micro/computers.	3.95	1
4.	Learn to use the computer for research	3.85	2
1.	Acquire knowledge of computer applications.	3.45	3
2.	Acquire knowledge of computer resources.	3.32	4

Responses from the interviews regarding what the users perceive their computing needs to be one year from now were oriented toward changes the users feel are necessary in order to accomplish their needs. The users would like to see:

- More widespread announcements of new facilities.
- Less restrictions on allocation of funds.
- Alternate charges in non-prime hours.

- No prime charge for computer use on holidays.
- Greater dissemination of computer terminals on campus.
- Faster response time in the use of the mainframe.
- Involvement of the university authorities in microcomputer applications and the interaction with the mainframe.

Social Science Computing. For this type of group Table 6.5 Appendix C indicates the data collected regarding the perceived need in one year from now. The table shows an average mean score of 2.84 for all the items, which indicates a moderate degree of need. Table 4.16 indicates the manner in which the items were grouped. Table 4.17 exhibits the items with a great need perceived by this group.

Table 4.16
Degree of Need Perceived By
Social Science Computing Users In One Year

DEGREE OF NEED	MEAN RANGE	NUMBER	RANGE OF RANKS
High	3.52-3.80	4	1-4
Fairly High	3.22-3.33	4	5-8
Moderate	2.28-3.00	5	9-13
Low	1.61-2.26	4	14-17

Table 4.17
Items Receiving a Great Need By Social Science Computing Users in One Year From Now

ITEM	NEED TO	MEAN	RANK
17.	Be aware of compatibility among micro/computers.	3.80	1
4.	Learn to use the computer for research.	3.75	2
14.	Learn where to get support and help regarding computers.	3.52	3
7.	Know where to obtain advice from computing services on campus.	3.52	4

The users of this type of computing application found it difficult to identify specific needs. However, they would also like to see some changes to correct a few problems they face. They would like to see the following:

- An extension of the operation time in the mainframe (MTS).
- Access to computers in a similar manner to the library card and at no additional cost.
- Less restriction in getting funds for the MTS system.
- More dynamic information about computers for research purposes.
- The PLATO group should be more oriented to internal rather than external users.

Other Type Of Computing. In this classification the mean and the rank order of the items of future need for computer applications perceived by the users in one year from now are indicated in Table 6.6 Appendix C. The manner in which the items were grouped are shown in Table 4.18 .

Table 4.18
Degree of Need Perceived By Users of Other Type of Computing In One Year

DEGREE OF NEED	MEAN RANGE	NUMBER	RANGE OF RANKS
High	3.34-3.95	4	1-4
Fairly High	2.68-3.26	5	5-9
Moderate	2.41-2.65	4	10-13
Low	2.13-2.33	4	14-17

The items in this classification which users perceived as important achieved a great need and are described in Table 4.19 .

Table 4.19
Items Receiving a Great Need By Users of Other Type of Computing in One Year From Now

ITEM	NEED TO	MEAN	RANK
17.	Be aware of compatibility of microcomputers and computers.	3.95	1
4.	Learn to use the computer for research.	3.95	2
1.	Acquire knowledge of computer applications.	3.87	3
5.	Learn to use the computer for teaching.	3.34	4

From the interviews, the information revealed the importance of solving minor problems perceived by the users. Desirable changes include:

- An expansion of automated teaching using the PLATO system.
- Faster responses for simple requests from the main systems.

In order to determine whether there was any significant difference between those needs at present and in one year from now, a t-test was used.

The t-test results determining differences between the needs for each type of computer applications are listed in Table 4.20 through Table 4.22 . The last two columns show the probability and the rank of importance for that particular need.

There were three items of needs with major differences beyond the 0.05 level in the Scientific Computing applications (Table 6.4, Appendix C). In their order of importance they are listed in table 4.20 .

Table 4.20
Major Differences Found In
Scientific Computing Users

ITEM	NEED TO	MEANS PRES.	MEANS FUT.	RANK
13.	Acquire documentation of both input-output of the major computer applications packages.	2.73	3.05	1
14.	Be aware of the compatibility among microcomputers and computers.	3.63	3.95	2
3.	Improve skills in using computer terminals.	2.68	3.04	3

There were five items of needs with large differences which users of Social Science Computing perceived beyond the 0.05 level (Table 6.5, Appendix C, p 154). They are placed in table 4.21 .

For users of other type of computing applications there were two items with major differences beyond the 0.05 level and in one item the differences were large at the 0.01 level (Table 6.6, Appendix C). The items of need were as indicated in table 4.22 .

Table 4.21
Major Differences Found In
Social Science Computing Users

ITEM	NEED TO	MEANS PRES.	MEANS FUT.	RANK
4b.	Learn about innovative computer applications with respect to teaching.	2.86	3.25	1
3.	Improve skills in using the computer terminals.	2.96	3.33	2
7.	Learn how to write their own programs.	1.83	2.50	3
4a.	Learn about innovative computer applications with respect to research.	3.57	3.75	4
11.	Know where to obtain support and trouble shooting help about computer systems on campus.	3.16	3.52	5

Table 4.22
Major Differences Found In
Users of Other Type of Computing

ITEM	NEED TO	MEANS PRES.	MEANS FUT.	RANK
14.	Be aware of the compatibility among microcomputers and computers.	3.58	3.95	1
1.	Acquire knowledge of computer applications.	3.70	3.87	2
3.	Improve skills in using computer terminals.	2.58	2.41	3

Considering the total sample (N=79) and the comparison of the needs at present and in one year from now, the findings revealed one item was highly different beyond the 0.01 level and seven items were beyond the 0.05 level. The needs are listed in table 4.23 .

Table 4.23
Major Differences Found By
All Respondents

ITEM	NEED TO	MEANS PRES.	MEANS FUT.	RANK
14.	Be aware of the compatibility among microcomputers and computers.	3.65	3.91	1
12.	Attend in-service workshops related to computer applications.	2.40	2.55	2
10.	Know the location and accessibility of computer terminals on campus.	2.21	2.33	3
3.	Improve skills in using the computer terminals.	2.74	2.94	4
4b.	Learn about innovative computer applications with respect to teaching.	3.06	3.24	5
11.	Know where to obtain support and trouble shooting help about computer systems on campus.	3.09	3.26	6
4a.	Learn about innovative computer applications with respect to research.	3.72	3.82	7
1.	Acquire knowledge about computer applications.	3.35	3.48	8

3. What Computer Systems are Currently used?

The information gathered from the respondents in relation to the systems they use on campus is indicated in Table 6.1 Appendix C. The title of the table, Frequencies of Access On The Systems, refers to which computer system the user employs and considers different systems listed in the questionnaire.

Those systems (column 1 Table 6.1) are the Michigan Terminal System (MTS), the Office of the Administrative System (OAS), PLATO System, Other Systems (as Mini/Micro computers different from the above systems). The last line refers to no use of any system.

Table 6.1 (column 9) indicates a high percentage of use (89.9%) of the MTS system from the total sample, considering the three types of group classification in comparison with the other systems. The Other System (4th Row) indicates a considerable percentage (45.6%) suggesting that most of the respondents have used a Mini/Micro computer in their departments. It appears that rarely are the OAS and PLATO systems used as often as the other systems.

The software which users are presently employing and which they perceive to employ in one year from now is specified in Table 6.2 Appendix C. The columns indicate the frequency of use according to the sample of each group of computing application and (within brackets) the rank of use for each.

The values placed in ranking the use of the software range from 1 to 9, representing High Use (1) and Low Use (9). For each type of group there are four columns of values which represent the software used at Present and the expected use of software in One Year From Now. The columns beside the frequencies are the representation of the rank for that particular group. There is an additional column for the total sample with the columns at Present and In One Year from Now, as well as the rank for each one.

All Respondents. All groups suggest a consistency in the use of software, however the total priorities considering the overall applications for the three types of groups show the following ranking in table 4.24 .

Table 4.24
Ranking Use of Software By
All Respondents

Software	Present	One Year
Textformatting	1	1
Programming Languages	2	3
Statistical Analysis	3	2
Graphics	4	4
Data Base Application	5	5

Scientific Computing Application. Under this category the use of the software at Present and In One Year from Now shows a slight difference in the current use and what they expect to use in one year. The five high ranks are shown in table 4.25 .

Table 4.25
Ranking Use of Software By
Scientific Computing Users

Software	Present	One Year
Programming Languages	1	1
Textformatting	2	3
Graphics	3	2
Statistical Analysis	4	4
Simulation	5	5

Again, the information obtained through the interviews revealed that users employ the computer mainly for:

- Statistical analysis packages.
- Textformatting for the production of exams, brochures and questionnaires.

- Teaching with the computer programming languages, and numerical analysis.
- Simulation.

Social Science Computing Application. Under this category the use of the software at Present and In One Year from Now shows a slight difference in the current use and what they expect to use in one year. The five high ranks are indicated in Table 4.26 .

Table 4.26
Ranking Use of Software By Social
Science Computing Users

Software	Present	One Year
Statistical Analysis	1	1
Textformatting	2	2
Programming Languages	3	5
Data Base Applications	4	4
Graphics	5	3

It is interesting to note that the respondents make a switch in the use of graphics from the sixth place to the third place in their perception of need in one year from now. In addition, the users seemed to have a reduced interest in using programming languages. Perhaps individuals feel they do not need to use the old packages because the new software included in the Mini/Micro computers.

The responses obtained from the interviews indicated that the users employ the computer primarily for:

- Research data, using statistical packages.
- Use of data bases of bibliographic information (e.g. ERIC).

- Teaching with the computer for statistics and data analysis.
- Use of the message system in the MTS.
- Textformatting.

Other Type Of Computing Application. Under this category the use of the software at Present and In One Year from Now parallels a combination of the other two types of applications in current use and what they expect to use in one year. The first five ranks are shown in table 4.27 .

Table 4.27
Ranking Use of Software By Users of
Other Type of Computing

Software	Present	One Year
Programming Languages	1	1
Textformatting	2	2
Statistical Analysis	3	5
Graphics	4	4
Data Base Application	5	3

During the interview process, the responses users gave for the application of the computer were mainly oriented toward the following:

- Use of statistical analysis packages.
- Use of textform processor.
- Use of the message system (UNIX and MTS systems).
- Use of programming languages.

4. Do the users know what type and amount of resources are available to them?

Most of the users on campus have had the opportunity of looking for sources of information about computer resources. In the sample selected, respondents knew or had some knowledge about computers. The last section of the questionnaire contained a question regarding the source of information about computers they may use. Respondents ranked the sources selected for the purpose of this study in order of importance (1 most important, 10 least important).

Table 6.3 Appendix C, shows the results of the total sample and each classification of computer application. Ten sources were selected and for each type of classification the table indicates the Mean and Rank in using that source of information.

All groups were oriented toward obtaining information about computers from colleagues in the same department (average mean of 2.42). The second place category was the computing services documentation (average mean of 2.73 from the total sample).

The other sources of information received slightly different ranking among the groups. There appeared to be a tendency of reading press material and documents from manufacturers (Mean 3.98), magazines and books (Mean 4.01), and technical literature (Mean 4.74). Some of the respondents also preferred courses on computing services (Mean 6.35). The sources being consulted less often were:

colleagues from other universities (Mean 6.43), computing science courses (Mean 7.04) seminars or workshops organized by computer organizations (Mean 7.25), and seminars or workshops organized by professional conferences (Mean 7.72).

In relation to the availability of the different computer systems (MTS, OAS, PLATO) the respondents indicated to make more use of the MTS system rather than the other two computer systems (OAS, PLATO). In Table 6.8 Appendix C, question #3 regarding computer resources supplies a perspective for each type of computer application group and the total sample. This question pertains to access to information users want or need from the systems.

A 94.9% of the total sample of 59, using the MTS system, have access to information that they want or need. Only 50% of the total sample of 14 indicate access to the OAS system and 76.5% of the total sample of 17 indicate access to the PLATO system.

Also in Table 6.8, 98.3% of the respondents (59 out of 60) consider the acquisition of a computer terminal with access to the MTS system worthwhile. However, 55% of the respondents (11 out of 20) did not consider access to the OAS worthwhile, and 54.5% of the respondents (12 out of 20) did not feel access to the PLATO system was necessary.

From sample of 72 respondents, 69.4% (50) of them use a Mini/Micro computer other than the MTS, OAS, or PLATO systems. Of the 53 respondents, 67.9% (36) acquired the Mini/Micro computer to perform tasks different from those supplied by the main systems. Interestingly, 77.3% (34 out of 44) of them acquired the Mini/Micro for control, 60.4% (29 out of 48) for reduced cost of using the central systems and 34.1% (14 out of 41) for privacy.

Also, 77.8% (42 out of 54) of the respondents use the Mini/Micro computer to connect to the MTS system and almost none use it for the other two main systems (OAS, PLATO). The documentation received by the respondents for the three main systems (MTS,OAS,PLATO) is indicated in question #6 of Table 6.8 Appendix C. The table shows 74.1% (43 out of 58) of the respondents receive information from the MTS system, 15.4% (2 out of 13) of the respondents receive it from the OAS system, and 30.8% (4 out of 13) receive information from the PLATO system.

5. How is communication between users and computing services characterized?

In Section III of the questionnaire under the topic General Aspects, there were questions regarding computing services on campus and the kind of relationship the respondents have with the main computer system(s) (MTS, OAS, PLATO). Table 6.10 Appendix C indicates the percentages related to general questions about the main computer systems on campus.

A majority of the respondents (93.6%) know where the Computer Services' offices are located for the MTS system. A 34.2% (13 out of 38) of the respondents know where the OAS offices are located, and 60% (24 out of 40) know where the PLATO offices are situated.

Regarding the type of communication or how useful the relationship is between users and the computer services offices is shown by question #20 in Table 6.10 . Again, 73.9% (51 out of 69) of the respondents considered themselves to have a functional relationship with the offices of the MTS system. But, just 31% (9 out of 29) of the respondents have a useful relationship with the offices of the OAS system, and 35.5% (11 out of 31) of the respondents have a working relationship with the offices of the PLATO system.

It appears that the users do not encounter major difficulties when requesting help from the different offices of the computer services. This is shown in question #21 where 82.6% (57 out of 69) of the users of the MTS system, 91.3% (21 out of 23) of the users of the OAS system, and 88.5% (23 out of 25) of the users of the PLATO system experience no difficulty.

The majority of the users are aware of the assistance provided by the different computer services (Table 6.10 Appendix C, p 165 question #22). In the MTS system 66.2% (51 out of 77) of the respondents are aware of the service. However, in the OAS system only 36% (9 out of 25) of the respondents, and in PLATO system only 42.9% (12 out of 28) of the respondents are aware of the service.

In question #5, Table 6.8 Appendix C, shows that users of the systems have had the opportunity to discuss approaches with the different computer services.

The responses indicate that for the MTS system, 78.7% of users have had the opportunity to discuss problems with the personnel of that center. Only 36.8% of the respondents said they have had the opportunity to discuss different approaches with the personnel of the OAS system, while 42.1% of the users have had this opportunity with the PLATO system personnel.

6. What kind of problems are users encountering in the application of the computer services?

Section III of the questionnaire contained an open-ended question concerning the kind of problems respondents encountered when using the system(s) (MTS, OAS, PLATO).

Most of the answers concerned the MTS system. Responses regarding the OAS and PLATO systems are reported as well. In relation to the MTS system, the total sample of respondents (79) did not perceive any major problems. This finding was consistent among Scientific Computing, Social Science Computing and Other Type of Computing.

Some minor annoyances expressed were:

- The MTS system is overloaded most of the time and the response time is poor.
- The consultants can not communicate the steps to

solve the problem. They should be more oriented toward user's goals.

- The system is down frequently throughout the terms.
- There are many failures of responses to commands in the systems.
- There are not Network Capabilities.
- The operation of the system should be of 24 hrs.

Besides these issues, each group perceived other problems characteristic to their computer jobs.

Scientific Computing.

- There is great difficulty in finding documentation pertinent to the system.
- The documentation and printed material is poor.
- There is a delay in implementing new developments. (e.g. Mathematical functions in word processing.)
- There is difficulty in understanding computer courses. They should hire teachers to instruct students on the use of the system.

From the information gathered in the interviews, the users have had some difficulties in using the main systems. They identified the following concerns:

- Limited number of terminals in the departments.
- Scarcity and restrictions on allocation of funds.
- Very slow response time from the system.
- Lack of consulting after usual office hours.
- Lack of PLATO group involvement with University departments.

- Superior rather than helpful attitude of consultants.
- Desire for consultants to be facilitators in every sense of the word.

Social Science Computing.

a. There are many bugs in programs developed in packages.

b. The security of the information is poor in tapes and disks.

c. The control of teaching labs is too centralized from computer services.

d. The documentation and printed material should be more user-friendly.

Individuals who participated in the follow-up interview were concerned with the following difficulties:

- Lack of lines to every office in the department.
- Scarcity of allocation of funds in the mainframes, therefore they tend to use microcomputers.
- Not enough courses regarding program languages on the mainframe system (MTS).
- No French characters for using textform.
- Expensiveness of telephone lines in the PLATO system.
- Consultants who are more oriented toward the system rather than to the users' goals.

Other Type Of Computing.

a. There are difficulties in the interface between UNIX and MTS systems (bugs in data communication).

b. There is low reliability in linking between Micros and the MTS system.

c. The Department of Computing Services is too big and bureaucratic, therefore they are slow to adapt.

In relation to the OAS system, the users have found the following:

- Insufficient documentation.
- Too rigid a position for service.
- Access of the information requires too many procedures.
- Access of the students' records should be through an MTS terminal.

The two groups which use the OAS system are Scientific Computing and Other Type of Computing.

Regarding the PLATO system the users perceived difficulty in the following areas:

- Not enough scientific programs.
- Not much interaction with academic departments.
- Few options available for instructional purposes (poor information/documentation).
- Access is restricted in the use of the operation system (accessability of use).

The results from the interview revealed some complaints that users of Other Type of Computing application group have experienced. These include:

- Scarcity of lines to connect with the mainframe

(MTS).

- Overload of computer time during regular terms.
- Changes in the systems the users do not know.
- Scarcity of computer funds.
- Large number of unstructured computer manuals.
- Lack of direction for users in the OAS system.

7. What is the perception of users about the effectiveness of services offered regarding computing on campus?

An overall perception gathered from the questionnaire is as follows:

MTS - The system is excellent and there is a pretty reasonable service through the Department of Computing Services.

Users complain mainly about the charging back policy, costs on printing material and funds allocated to departments. Respondents would also like to encourage the Computing Services Department to provide a consulting service more oriented toward the users' goals.

They believe that the courses offered on campus about computers should be taught by teachers who have the ability to communicate the concepts to students. In addition, users would like to see more involvement from the Computer Services Department regarding microcomputers workshops and seminars about the interaction with the mainframe system.

An overall perception of the communication offered by the computer services from the users' point of view is as and MTS systems (bugs in data communication).

b. There is low reliability in linking between Micros and the MTS system.

c. The Department of Computing Services is too big and bureaucratic, therefore they are slow to adapt.

In relation to the OAS system, the users have found the following:

- Insufficient documentation.
- Too rigid a position for service.
- Access of the information requires too many procedures.
- Access of the students' records should be through an MTS terminal.

The two groups which use the OAS system are Scientific Computing and Other Type of Computing.

Regarding the PLATO system the users perceived difficulty in the following areas:

- Not enough scientific programs.
- Not much interaction with academic departments.
- Few options available for instructional purposes (poor information/documentation).
- Access is restricted in the use of the operation system (accessability of use).

The results from the interview revealed some complaints that users of Other Type of Computing application group have experienced. These include:

- Scarcity of lines to connect with the mainframe

(MTS).

- Overload of computer time during regular terms.
- Changes in the systems the users do not know.
- Scarcity of computer funds.
- Large number of unstructured computer manuals.
- Lack of direction for users in the OAS system.

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An overall perception gathered from the questionnaire is as follows:

MTS - The system is excellent and there is a pretty reasonable service through the Department of Computing Services.

Users complain mainly about the charging back policy, costs on printing material and funds allocated to departments. Respondents would also like to encourage the Computing Services Department to provide a consulting service more oriented toward the users' goals.

They believe that the courses offered on campus about computers should be taught by teachers who have the ability to communicate the concepts to students. In addition, users would like to see more involvement from the Computer Services Department regarding microcomputers workshops and seminars about the interaction with the mainframe system.

An overall perception of the communication offered by the computer services from the users' point of view is as follows:

- The effectiveness of communication of the computer services, mainly the MTS system, is considered to be high, even though consultants are not oriented toward users' goals. Most of the respondents prefer to consult colleagues in their department in order to gain immediate access and understanding of a problem. Users withheld their comments for the other systems (PLATO, OAS) because they do not use them.

B. Differences Between Groups

Presented in Table 4.28 are the probabilities associated with the F ratio that resulted from a Two-Way analysis of variance carried out on the items 1-17 in Section II of the questionnaire. These probabilities relate to the response relevant to the current state. An SPSSx program was used for this analysis.

This technique was used to compare the responses by department types, high and low intensity use of computer applications and to examine the impact of the interaction between those two main dimensions. The total results of the ANOVA procedure applied to at present are reported in Appendix D Tables 7.1 through 7.17 .

Table 4.28
Probability of "F" Ratios Resulting From A
Two-Way Analysis of Variance By Type Of Department
and Intensity of Use At Present Time

NEED TO:	N=	PROB F BY DEPT	PROB F BY INTENS	PROB F 2-WAY INTERA
1. Acquire knowledge of computer application	71	0.21	0.08	0.89
2. Acquire knowledge of computer resources	71	0.59	0.62	0.67
3. Improve skills in computer terminals	71	0.85	0.52	0.16
4. Learn to use the computer for research	71	0.65	0.20	0.75
5. Learn to use the computer for teaching	71	0.78	0.21	0.11
6. Learn to use the computer for administration	56	0.04	0.14	0.74
7. Know advice of computer services	56	0.08	0.18	0.95
8. Learn political factors of computer resources	56	0.09	0.01	0.23
9. Learn socio-economic factors of computer resources	56	0.11	0.01	0.36
10. Learn to write my own programs	56	0.29	0.67	0.86
11. Learn the functions of computer services	69	0.44	0.81	0.91
12. Learn where to access administrative information	69	0.01	0.11	0.13
13. Know location of computer terminals	69	0.15	0.45	0.54
14. Learn where to obtain help and support	69	0.63	0.05	0.56
15. Attend workshops	69	0.66	0.08	0.71
16. Acquire documentations of packages in computers	67	0.44	0.29	0.84
17. Be aware of compatibility among micro-computers	67	0.74	0.13	0.90

It seems apparent that two items most differentiate among department types and relate to information needs about administrative applications (items #6, #12). The analysis indicates that the departments characterized as "Other Type of Computing" had the greatest needs and the departments characterized as "Scientific Computing" had the least needs. It should be noted that even the mean of greatest need fall in the 2.73 range, which according to the group scale is only a moderate response.

In relation to the probabilities of F ratio in the intensity of use categorization, there were two items with major differences. Item 8 and item 9 are related to the knowledge of political and socio-economic factors about computer resources. It appears that the department characterized as "Scientific Computing" with high intensity use had the greatest need for the information of these factors, while the departments characterized as "Other Type of Computing" with high intensity use had the least need.

There does not appear any great number of meaningful difference variances attributable to interactions of the main effects. Table 4.29 presents the probabilities associated with the F ratio that resulted from a Two-Way analysis of variance carried out on items 1-17 as for the perceived needs one year from now. The total results of the ANOVA procedure applied to in one year from now are reported in Appendix D Tables 7.18 through 7.34 .

Table 4.29
Probability of "F" Ratios Resulting From A
Two-Way Analysis of Variance By Type Of Department
and Intensity of Use In One Year From Now

NEED TO:	N=	PROB F BY DEPT	PROB F BY INTENS	PROB F 2-WAY INTERA
1. Acquire knowledge of computer application	68	0.11	0.22	0.27
2. Acquire knowledge of computer resources	68	0.63	0.97	0.86
3. Improve skills in computer terminals	68	0.14	0.18	0.44
4. Learn to use the computer for research	68	0.75	0.46	0.98
5. Learn to use the computer for teaching	68	0.81	0.57	0.02
6. Learn to use the computer for administration	54	0.03	0.11	0.67
7. Know advice of computer services	54	0.08	0.13	0.98
8. Learn political factors of computer resources	54	0.05	0.01	0.04
9. Learn socio-economic factors of computer resources	54	0.14	0.01	0.13
10. Learn to write my own programs	54	0.78	0.61	0.54
11. Learn the functions of computer services	66	0.71	0.68	0.86
12. Learn where to access administrative information	66	0.11	0.13	0.34
13. Know location of computer terminals	66	0.29	0.47	0.43
14. Learn where to obtain help and support	66	0.43	0.04	0.77
15. Attend workshops	66	0.67	0.08	0.69
16. Acquire documentations of packages in computers	66	0.88	0.47	0.53
17. Be aware of compatibility among micro-computers	66	0.98	0.30	0.87

There was one item with a major difference among the items when considered by department types. This was related to an information need about the use of the computer for administrative applications. The analysis indicates that the departments characterized as "Other Type of Computing" had the greatest need and the departments characterized as "Scientific Computing" had the least need.

Regarding the probability of F ratio in the intensity of use, there were three items with major differences. The analysis indicates that the departments characterized as "Other Type of Computing" and in lower user group had higher need for knowledge of the political factors for computer allocation resources. While in the "Scientific Computing" and "Social Science Computing" departments and higher user group had the greatest need for knowledge about the above item.

For item #9 (socio-economic factors for computer allocation resources) the analysis indicates that the "Other Type of Computing" departments and high users had the least need for this item, while the "Scientific Computing" departments and high users had the greatest needs.

The last item showing meaningful differences was the information need of knowing where to obtain help and support about computer systems on campus (item #14). It appears from the analysis that lower user groups had the higher need compared to high intense groups.

There were two items with major differences attributed to the probability of the F ratio in the Two-Way interactions. They were the information need about learning to use the computer for teaching activities (item #5) and the item regarding political factors for computer allocation resources (item #8).

In the first item (#5) appears that the departments characterized as "Social Science Computing" and less intense users desire to have the most information about teaching with the computer, while intense users may have developed the use in teaching.

The departments characterized as "Other Type of Computing" and low user group had a higher need for knowledge of political factors related to computer allocation resources, while the other two department groups, the more users had the greatest need for knowledge about the item.

In light of the 102 F ratios conducted for this study the fact that only 10% of the probabilities associated with the ratios were at the 0.05 level could be interpreted to mean that the differences between intense and non-intense users across department types while real are not great. However, the previously reported results of the interviews indicated that information to be supplied to departments should be developed in terms of the needs and interests of each department.

C. Planning Group II

In this section the results of Planning Group II survey are presented. An explanation of how those results are related to this study is presented.

Planning Group II administered a questionnaire to all faculties on campus at the University of Alberta.

Individuals who were approached were primarily the faculty members, administrators and academics for each faculty. Of 1939 questionnaires sent by this group, 1460 (75%) usable returns were analyzed.

The questionnaire of Planning Group II was divided into the following sections:

- Computing Experience;
- Computing Applications;
- Computing Application Needs;
- Access to Computing Equipment;
- Major Computing Facilities; and
- Computing Policies.

Some of the sections from the Planning Group II Survey and this study appear to be related and were compared in order to confirm the consistency of answers given in both studies.

Regarding the computing experience section, Planning Group II found that 20% (264) of the respondents had no expertise, 28% (365) of the respondents had little expertise, 28% (378) of the respondents had moderate expertise and 24% (320) of the respondents had a lot of expertise.

The distinctions of the questionnaire for this study align with the three categories of little, moderate and a lot of expertise, following the assumption that the faculty members approached possess some knowledge about computers.

In the interview, one of the questions attempted to assess the level of expertise individuals considered themselves to possess concerning computers and their interaction. From the results of the interviews, 31% (4) of the respondents had little expertise, 38% (5) had moderate expertise and 31% (4) had a lot of expertise. The findings from the research study are consistent with those of Planning Group II in this area.

With respect to the section of Computing Applications, Planning Group II found the following items and their importance on the scale of 1 to 5 (Not Important at all to Extremely Important), these are indicated in table 4.30 .

Word processing or textformatting was found as a high software application for this study as well. It was followed by the item of programming languages and the statistical analysis packages.

In the section of Computing Application Needs, Planning Group II extended the questions on computing application to the current software the respondents employed, and how they would like to use it in the next three years.

Table 4.30
Computing Applications
From Planning Group II

ITEM	APPLICATION FOR:	MEAN	N=
13.	Research support within the department.	4.01	1280
12.	Analyzing research data.	3.93	1225
16.	Graduate student support.	3.56	1041
19.	Administrative word processing.	3.50	1143
20.	Other administrative functions.	3.41	232

The perceived change was indicated on a scale of 1 to 4 (Decrease, Remain the Same, Increase Some, Increase A Lot) and is illustrated in the table 4.31 .

Table 4.31
Current Software Employed
From Planning Group II Survey

SOFTWARE	GRADUATE		RESEARCH		ADMIN.	
	Mean	N=	Mean	N=	Mean	N=
Textformatting	2.77	717	3.04	1000	2.89	817
Graphics	2.86	527	3.10	788	2.73	436
Computers in Coursework	2.97	637	2.94	408	2.60	249
Data Base Management	2.65	441	2.98	697	2.94	567
Numerical Computing	2.54	409	2.71	571	2.42	334

There appears to be some consistency in the application of the software provided by the MTS system in these groups and the data gathered for this survey (Table 4.24).

The section of Access to Computing Facilities reflects similar results obtained in both studies, especially the MTS system and microcomputers. Different results on the other major computing facilities may be due to the size of the sample for this study and as a result of heavier administrative involvement in Planning Group II. The results are indicated in Table 4.32.

Table 4.32
Access To Computing Facilities

	PLANNING GROUP II	THIS SURVEY
MTS	79% (1066 out of 1460)	78.4% (58 out of 79)
OAS	47% (687 out of 1460)	5.3% (3 out of 79)
PLATO	23% (313 out of 1460)	5.3% (3 out of 79)
MICROS	56% (762 out of 1460)	69.4% (50 out of 79)

Comparing the section on Major Computing Facilities and the problems respondents have had during the use of the systems, the findings are similar even though the sample for this study was smaller.

By way of comparison in the OAS system, respondents indicated having difficulties in using the system as follows: Planning Group II, 20% (257 out of 687) had problems; this study, 15.4% (2 out of 13) had problems. The main difficulty in the use of this system was generally due to the inadequacy of information provided by computer services. This was consistent in both studies.

In questions regarding the MTS system, the results were quite different in percentages when considering difficulties the users had experienced. In Planning Group II, 30% (331 out of 1055) had problems while in this study 61% (37 out of 51) had problems. The overall satisfaction of users employing this system was very good in both studies.

The results from the last section of Planning Group II Survey were not applicable for comparison to this study. However, many of the concerns arising from this study were similar to those mentioned in the Planning Group II Survey.

Both studies revealed respondent anxiety over charge-back policy, allocation of funds, and costs of materials (see question #6 and #7 of this chapter). It appears that in this study the responses were not considered official for the university, while in Planning Group II the respondents were dealing with an official committee for the evaluation of the responses.

It is important to emphasize the differences in the samples surveyed in both studies and try to differentiate the results. Even though the topic is very similar the respondents approached were somewhat different. Planning Group II included administrators and full-time faculty members while the sample for this study only included full-time faculty members. The difference in sample make up may also account for the variance in the findings.

D. Summary

In this chapter the findings of the study were reported and discussed. The data for this study were provided by questionnaire returns from 79 (50%) full-time faculty members. A sample of six departments was selected from full-time faculty members who were working at the University of Alberta. The data were analyzed and presented in terms of the respondents' perceptions regarding current needs for computer applications and the familiarity of the respondents with computer facilities.

Rather than responding to specific needs, the groups were oriented toward suggesting some changes which would correct some of their problems. However, there were some major differences at the 0.05 level with items of needs perceived by the respondents. The item receiving the highest emphasis was the need to be aware of the compatibility among minicomputers and computers on campus.

From the results generated with the Two-Way analysis carried out on items 1-17 in Section II of the questionnaire, only 10% of the probabilities associated with the ratios were at the 0.05 level. This could be interpreted that the differences between intense and non-intense users across departments are not great. The information to be supplied to departments should be developed according to the needs and interests of each department.

Even though most of the respondents used the MTS system they were aware of the other main systems on campus (OAS, PLATO). Also, it appears that users do not encounter major difficulties when requesting help from the different computer services' offices. It appears that the relationship users have with those services is very functional.

The perceptions gathered from the respondents regarding the effectiveness of communications of computing services offered on campus, was generally considered to be high. This perception was more oriented toward the use of the MTS system rather than the other two systems (OAS, PLATO), because users did not employ those services as often as the MTS system.

A summary form and comparison of results using the compiled information from the Planning Group II Survey and its findings related to this study was done with the purpose of establishing the reliability of the information gathered.

Chapter V

SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

This chapter presents a summary of the study, followed by conclusions and implications. The chapter concludes with recommendations for further research.

A. Summary of the Study

The Problem

The problem of this study was to determine the perception of faculty members at the University of Alberta relative to the use of the services offered in computing applications. In addition, the perceived effectiveness of the services was investigated from the point of view of the users.

The study focussed upon three areas: information seeking behavior in relation to the use of computers, current computing applications (Mainframe or Mini/Microcomputers), and the effectiveness of the current relationship between the computing application in each classification of the departments and the computer services applied.

The study investigated the differences of perceptions among the three classifications of departments by the type of computing application. As well the findings were compared to the results obtained from Planning Group II Survey.

Methodology

The data for the study were collected by using a questionnaire. Usable returns were received from 79 respondents who were the selected sample of the population. Respondents included full-time faculty members of the departments selected at the University of Alberta.

After the initial data collection by questionnaire, a follow-up interview was scheduled for those individuals who indicated a desire to participate in the study.

The data were analyzed to determine the perceptions of faculty members regarding their expressed needs in using computers, what current computer applications they were employing, and the relationship they had with the different computing services on campus. Also included in the data analyses were differences of perceptions between the current and future (in one year from now) needs for computing applications for each type of classification group.

Results from the study were then briefly compared to the findings of the Planning Group II Survey to ensure their reliability.

Findings

Differences of perceptions between the current needs and those in one year from now for computer applications were examined. Differences among groups and types of computing application were also investigated and generated the following results:

1. **Needs for Computing Applications At Present.** In general the questionnaire items for each classification of computing application groups were the same. However, the perceptions of need by the departments tended to be unique for each of the three classifications. The items of needs for computing application receiving the first and second ranking of importance by the total population were to learn about innovative computer application with respect to research, and to be aware of the compatibility among computers and microcomputers on campus.

2. **Needs for Computing Applications in One Year From Now.** Rather than specific needs the groups were oriented toward suggesting changes to correct a few problems they were encountering. They anticipated that the changes would enhance the accomplishment of their needs. The items listed on the questionnaire which were ranked first and second by the total sample were: to be aware of the compatibility among computers and microcomputers on campus and to learn about innovative computer application with respect to research.

Considering those items of the questionnaire regarding needs at present and in one year from now, there were items of needs with major differences beyond the 0.05 level and one item with difference beyond the 0.01 level from the total sample.

The item of need receiving the most emphasis was to be aware of the compatibility among computers and microcomputers on campus. Items with large differences beyond the 0.05 level were:

- to attend in-service workshops related to computer applications;
- to know the location and accessibility of computer terminals on campus;
- to improve skills in using computer terminals;
- to learn about innovative computer applications with respect to teaching;
- to know where to obtain support and trouble-shooting help for computer systems on campus;
- to learn about innovative computer applications with respect to research; and
- to acquire knowledge about computer applications.

3. **Use of Computer Systems.** Computer systems which users are currently employing are:

- MTS 89.9%
- OAS 3.8%
- PLATO 8.9%
- MICROS 45.6%

For use of the software provided by the systems, (primarily the MTS system) the total sample of users showed overall preferences for:

- Textformatting;
- Programming Languages;
- Statistical Analysis Packages;
- Graphics; and

- Data Base application.

4. Type and Amount of Resources. Most of the users on campus made a practice of obtaining information about computers from colleagues in the same department and reading Computing Services documentation. Some individuals consulted press material and documents from manufacturers, magazines and books as alternate sources of information.

5. Communication Between Users and Computing Services. It appears that users of the main system(s) (MTS, OAS, PLATO) do not encounter major difficulties when requesting help from the different offices. With respect to the type of communication between the users and Computing Services, 73.9% indicated having a functional relationship with the offices of the MTS system. For the offices of the OAS system 31% of the respondents acknowledged a workable relationship while 35.5% of the respondents had one with the offices of the PLATO system.

6. Users' Problems with Computing Applications. The major problem encountered in the application of computers was the scarcity of the number of terminals or connection lines in the departments to access the mainframes (MTS, OAS, PLATO). In the MTS system, users expressed the following annoyances:

- The system is overloaded most of the time;
- The consultants should be oriented towards users' goals; and
- The operation of the MTS system should be 24 hrs.

In the OAS system the complaints were as follows:

- There is insufficient documentation for the system;
- The position regarding service is too rigid; and
- Access to the students' records should be through an MTS terminal.

For the PLATO system, the major complaints were:

- There are not enough scientific programs;
- There is little interaction with academic departments; and
- There are few options available for instructional purposes.

7. **Perceived Communication and Computing Services.** The perceived communication from the point of view of the users was generally good regarding the Computing Services offered for their computing applications. According to the responses provided from the interviews, users interpret the communication of the systems as being technical functioning of the systems rather than as the fulfilment of the real needs of the users. They seem to agree that the relationship with the services provided is very functional, but they would like to see those services more related to their needs. Because in many cases the respondents were unaware of the capabilities of the systems there was some difficulty in identifying department needs.

B. Conclusions

Based on the findings of this study, certain conclusions can be drawn. These conclusions are related to the stated purposes of the study and problems posed, and also grow out of an interpretetion of the data analysis.

1. **Needs for Computing Applications.** The findings indicate a strong need for widespread information about the computer systems and the utilization of their software for the fulfilment of users' objectives. The highest needs for computing applications were in the areas of research and teaching with computers, the acquisition of knowledge of computer resources, as well as new technology in computer applications.

Because individuals have some difficulty identifying specific information in computer functions they tend to focus on suggestions for changes in an attempt to correct problems they often experience. When considering the characteristics of the computer application group and the high and low intensity users in those groups, the differences were minimal. It seemed that respondents among groups (Scientific Computing, Social Science Computing, Other Type of Computing) with high use of the computer systems, perceived greater needs than those with low use. It may be easier for such persons to identify their needs because of the relationship with and high use of the computer systems than it is for those individuals who are beginning to use them.

2. **Use of Computer Systems.** The Michigan Terminal System (MTS) obtained a high rate of use due to the widespread availabilty of terminals and its flexibility to serve all types of users on campus. The Office of the Administrative system (OAS) operates in a more restricted mode due to the confidential type of information they manage. A narrower scope of users have access to the system because of the necessary security and confidentiality which is required. In addition, the OAS system appears to be oriented toward information collection rather than user service.

In the Programmed Logic for Automatic Teaching Operation system (PLATO) the orientation of the system is to serve faculty members and academic departments on campus in the provision of training services and delivery of instruction. Although PLATO is capable of providing course material and assistance in the development of delivering instruction for every campus departments, these services are seldom used.

3. **Type and Amount of Resources.** Most of the respondents were aware of the type and amount of computer resources on campus. For technical information concerning the use of the computer systems they consulted colleagues in the same department who had some expertise. In addition, the documentation and information disseminated on campus played an important role regarding the systems users employ. It appears that respondents were very interested in seminars

and workshops from the different computer services. They wish to know the possible functions computers may perform for the accomplishment of their needs.

One of the main problems is the scarcity of funds and terminals within the departments in the application of computing which restricts the freedom of the users in employing the computer.

4. Users' Problems with Computing Applications. Respondents in the survey expressed some annoyances rather than problems which were related to the amount of resources they have from the systems. Among the concerns were the orientation of the consultants to users' needs, overload of the MTS system during regular terms, and an expressed need to extend the operation time on the mainframe.

5. Perceived Communication and Computing Services. From the findings it appears that the communication of the Computing Services (MTS) from the point of view of the users is considered to be very good. The complaints were restricted to secondary effects that the computer systems are experiencing, such as the allocation of funds, and the charge-back policies by departments. The other systems (OAS, PLATO) were difficult to evaluate because of a lack of information and low use of those systems by the respondents.

C. Implications and Recommendations

It is evident from the findings that a need for greater computing application activities exists in the university under study. Based on the findings, the following implications and recommendations for practice at the University of Alberta should be considered:

1. Commitment to application of computer systems should be included in the policies of the university administration.

   The literature review reveals that in universities, high level administrative approval and involvement should be secured and maintained as institution policy making relevant to computer shifts and changes.

2. A permanent computer center committee should be established on campus (similar to Planning Group II) as the responsibility of the Vice-President of Academic Affairs. This recommendation was made because of the increased use of the computer and the need to bring together planning and computing functions among the departments. The committee should establish a continuing needs assessment program to monitor the overall operational needs of the university with respect to computing applications. The above recommendation is based on the responses of the interviews which indicated a strong need for widespread information about the computer systems and the utilization of software. In addition, there seems to be a lack of specific

information concerning computer functions in some of the departments selected.

3. A subdivision of the computer center committee should be established to address the specific needs of faculty members on campus, by faculties or departments. The findings indicate that most of the respondents do not know the specific functions that may be accomplished with the use of the computer.
4. Academic staff should be encouraged to participate in computing application activities and provide appropriate recognition of the active participants in computing application programs. This is attributable to the literature review, where a formal needs assessment with heavy involvement of the academic departments was seen as a productive beginning point.
5. The different Computing Services on campus should encourage seminars and workshops among faculty users to identify and fulfill users' goals. The findings show that respondents were very interested in seminars and workshops related to the possible functions computers may perform for the accomplishment of their needs. In addition, the literature review indicates that in general, institutions of higher education wished to encourage the use of the appropriate computing systems in their teaching functions and that increasing staff knowledge was a key to this endeavor.
6. In order to gain wider acceptance of computing

applications in the university, initial efforts to increase computing application activities should focus upon the groups that appear least knowledgeable in the use of the computer. From the findings it appears that faculty members with high use of the computer systems perceived greater needs than those with low use. It might be easier for such persons to identify their needs and the uses of the computer systems as constrasted to those individuals who are beginning to use the systems and are unaware of the potential of the computer.

7. The personnel of Computing Services should be trained and encouraged to teach and explain to users the source and type of information available on campus. This is supported by the findings concerning the need for better communications between the Department of Computing Services and the academic departments. The comments made by respondents alluded to the difficulty of understanding computer courses offered in the Department of Computing Services.
8. Adequate funds for computing applications and active participation should be provided and allocated. One of the major concerns for some of the respondents was the scarcity of computer funds when compared to the cost of lines for connecting computer terminals to the mainframes.
9. The expansion of the use of microcomputers should be rationally guided to align with the policy of use of the

central computer(s) and its integration. The recommendation is based on the findings of the interviews where 45.6% of the respondents are using microcomputers and are requesting a more efficient exchange of information about the interaction of microcomputers and the mainframe.

D. Recommendations for Further Research

A number of suggestions for further research seem appropriate. Research based on these suggestions could lead to further expansion of knowledge relating to computing applications in institutions of higher education. Topics to consider are as follows:

1. Studies similar to this one should be conducted on other faculties of the university under study. Integration of the findings of these studies would provide a more comprehensive understanding of computing applications for this university and these findings may be applicable to similar institutions.
2. A study relative to perceptions of students regarding the need for computing application could also provide a more comprehensive view of computing application programs.
3. An extensive study relative to the effectiveness of the Computer Services programs could increase the participation of faculty members and strengthen the support from administrators.

4. A study relative to the efficiency of computing applications could enhance the fiscal accountability of such applications.
5. An examination should be conducted into the relationship between documentation of the systems and consultants as compared to the users of the systems. This investigation could expand the knowledge in the field of effective computing application.

BIBLIOGRAPHY

Bent, Dale
"Computers and Education:Opportunities for the 1980's". Publication of the Mathematics Council of the Alberta Teacher's Association. pp5-11, October 1982.

Beering, Steven C.
"Supercomputer Issues from a University". EDUCOM Bulletin. V19 N1 pp11-14, Spring 1984.

Brown, Bill
"User Services In A Semi-Autonomous, Decentralized Computer Environment". Association for Computer Machinery. pp29-38, 1980.

Childers, Thomas
"The Information-Poor in America". Metuchen, N.J.:Scarecrow Press, pp36-37, 1975.

Clark, Donald W.
"Surviving The Consolidation Crunch Through The Use Of A Minicomputer". Cause/Effect Bulletin. V1 N6, pp2-7, November 1978.

Conrad, Lora P.
"Applying Computers Effectively in The Small Two-Year College". (AEDS Proceedings pp 191-194).

Cox, W. F. and H. J. Fletcher
"Information Seeking VS Information Utilization in Children's Induction for Incomplete Pictures". Perceptual Motor Skills. N43, pp151-153, 1976.

Culbertson, Jack A.
"Perspective". Educational Administration Quarterly. V17 N1, pp25-47, Winter 1981.

Cummins, Thompson R.
"Question Clarification in the Reference Encounter". Canadian Library Journal. V41 N2, pp63-67, April 1984.

Dunn, William N.
Public Policy Analysis:An Introduction. Englewood Clifs, N. J.:Prentice Hall Inc., 1981.

"Faculty Computer Literacy:Program Development and Implementation". EDUCOM Bulletin. (October 18, 19; October 30; November 28; December 12), 1984.

Franz, Joan
"Planning for Future User Services". Association for Computer Machinery. pp100-103, 1979.

Hardy, Andrew P.
"The Selection of Channels When Seeking Information: Cost/Benefit VS Least-Effort". Information Processing and Management. V18 N6, pp289-293, 1982.

Hasenfeld, Yeheskel
Human Services Organizations. Englewood Cliffs:Prentice-Hall Inc., New Jersey 1983.

Heydinger, Richard B. and Donald M. Norris
"Decentralized or Centralized Systems for Colleges and Universities?". Cause/Effect Bulletin. V2 N5, pp2-7, September 1979.

Hodgson, Peter and Marilyn Chilvers
"The Use of SPSS Report as a Management Information System". Journal of Tertiary Education. V4 N1 pp27-41, May 1981.

House, Ernest R.
Evaluating With Validity. Beverly Hills Cal.:Publications, Inc. 1980.

Hoy, Wayne K., and Cecil G. Miskel
Educational Administration:Theory, Research and Practice. New York:Random House, 1978.

Karges, Marjorie and B. Dean Bowles
"Needs Assessment". Community Relations for Schools. Wisconsin, 1979.

Kaufman, Roger
"Identifying and Solving Problems: A Systematic Approach". University Associates Publishers: La Jolla California. 1976.

"A Positive Taxonomy of Needs Assessment". Educational Technology. V17 N11, pp60-64, November 1977.

Kelly, Joe
Organizational Behavior:Its Data, First Principles, and Applications. Irwin Inc.:Homewood, Illinois 1980.

King, John Leslie
"Centralized versus Decentralized Computing: Organizational and Management Options". Computing Surveys. Vol 15 N4 pp319-349, December 1983.

Krikelas, James
"Information-Seeking Behavior:Patterns and Concepts". *Drexel Library Quarterly (Foundations of Library Practice).* Vol 19 N2 pp5-20, Spring 1983.

Lipson, Joseph
"Riding the Wave of the New Information Technologies: The Administrator's Role". *EDUCOM Bulletin*. pp7-11, Winter 1981.

Marvin, Lee., Sidney R. Miller and Burton J. Silverstein
"Potentials and Limits of Computers in Schools". *Educational Leadership*. pp498-501, Spring 1980.

Mohapeola, J. M.
"The University and the Schools in Developing Countries". *Higher Education*. V10 N3 pp275-295, May 1981.

Nordby, Gordon L.
"Minicomputer Acquisition Policy: A Process and a Conclusion". *EDUCOM Bulletin*. V13 N2, pp2-8, Summer 1978.

Petruk, Milton W.
"The Computer Forty-Year Evolution". *The Canadian School Executive.* pp2-3, May 1982.

"A Progress Report For Higher Education From The EDUCOM Computer Literacy Project (ECLP)".*EDUCOM Newsletter.* V2 N1, Fall 1984.

Provus, Malcom
"Evaluation of Ongoing Programs in the Public School System". *National Society for the Study of Education.* 68th Yearbook Part II, University of Chicago, 1969.

Richey, R. Wayne
"The Feasibility of Replacing Existing Central Computers With A Single Computer Facility". *Cause/Effect Bulletin.* V2 N4, pp2-9, July 1979.

Robbins, Martin D., William S. Dorn, and John E. Skelton
Who Runs The Computer? Strategies for the Management of Computers in Higher Education. Westview Press:Boulder Colorado, 1975.

Robinson, Louis
"The University-Industry Relationship". *EDUCOM Bulletin*. V17 N4 pp6-25, Winter 1982.

Rouse, William B. and Sandra H. Rouse
"Human Information Seeking and Design of Information Systems". Information Processing and Management. V20 N1-2, pp129-138, 1984.

Rowland, Howard R.
"Looking Ahead". New Directions For Institutional Advancement. N10 pp93-108, 1980.

Schein, Edgar H.
"Increasing Organizational Effectiveness Through Better Human Resource Planning and Development". Sloan Management Review. V19 N1, pp1-20, Fall 1977.

Scott, W. Richard
Organizations Rational, Natural, and Open Systems. Prentice-Hall:Englewood Cliffs, New Jersey 1981.

Scriven, Michael
"Evaluating Educational Programs". The Urban Review. V9 N4, pp22, May 1969.

Scriven, Michael and Jane Roth
"Needs Assessment: Concept and Practice". New Directions for Program Evaluation. pp1-10, Spring 1978.

Shain, Irving
"National Information Policy Issues and Higher Education". EDUCOM Bulletin. pp3-18, Spring 1982.

Spuck, Dennis W. and Gene Atkinson
"Administrative Uses of the Microcomputer". Association for Educational Data System Journal (AEDS). V17 N1, pp83-91, Fall/Winter 1983.

Stake, Robert E.
"The Countenance of Educational Evaluation". Teachers College Record. V68 pp523-540, Columbia University, 1967.

Stufflebeam, Daniel L.
Evaluation as Enlightenment for Decision-Making. Columbus:Ohio Evaluation Center, 1968.

Summers, Edward et al
"The Effect of Personal, Professional and Psychological Attributes, and Information Seeking Behavior on the Use of Information Sources by Educators". Journal of the American Society for Information Science. V34 N1 pp75-85, January 1983.

Taba, H., and E. Sawin
"A Proposed Model in Evaluation". Educational Leadership. V20, pp57-71, 1962.

Taylor, Robert S.
"Question-Negotiation and Information Seeking in Libraries". College and Research Libraries. N29 pp178-194, May 1968.

"The Tomorrow in New Technology; Frontiers in Administrative Computing; Adventures in Instructional Computing". Association for EDucational Systems (AEDS). Washington D.C., 513 pages, ED 223 239, 1982.

Trimby, Madeline J.
"Needs Assessment Models: A Comparison". Educational Technology. pp24-28, December 1979.

Weizenbaum, Joseph
Computer Power and Human Reason:From Judgment to Calculation. W. H. Freeman and Company:San Francisco California, 1976. .

Werner, Thomas
"Data at Your Fingertips". American School and University. V56 N1 pp68-74, September 1983.

Witkin, Belle Ruth
"Needs Assessment: Kits, Models and Tools". Educational Technology. V17 N11 pp5-17, November 1977.

Worthen, Blaine R., and James R. Sanders
Educational Evaluation:Theory and Practice. Belmont California:Wadsworth Publishing Co. Inc., 1973.

APPENDIX A. QUESTIONNAIRE

A STUDY OF THE EFFECTIVENESS OF COMPUTING SERVICES OFFERED AT THE UNIVERSITY OF ALBERTA

To the Academic Staff and Faculty Members:

As one part of the data collection for my Ph. D. thesis in the Department of Educational Administration, I am gathering information about the use of computers at the University of Alberta. I wish to request your participation in the study by asking you to complete a questionnaire. The attached questionnaire is intended to elicit your opinion, as a member of the University of Alberta, on matters concerning the application of computer systems.

The study will survey the following:

1. the actual and perceived need of computer applications;
2. how users receive the information about the type and amount of resources available at the Universi
3. what kind of problems users are encountering in the use of computer resources.

Support for this study has been given by Dr. Dale H. Bent Director of the Computing Services Department and the members of Planning Group II - the future of computing on this campus. Your individual participation is entirely voluntary and confidentiality is guaranteed. Your cooperation in responding to the questionnaire will provide valuable information regarding the services offered by the University.

In order to extend the information used and to provide additional reliability from the questionnaire, I would also ask you to consider participating in a follow-up interview, once again ensuring your anonymity as an individual participant. Your name or position will not be identified in any way in the report of the findings. If you require further information concerning the study or the questionnaire please feel free to contact me at 432-3792.

Thank you very much. Your contribution will enhance the value of the study.

Yours truly,

Gabriel Navarro

May 1, 1985

To: Academic Staff and Faculty Members

From: Gabriel Navarro

RE: Effectiveness of Computing Services Questionnaire

In mid April, I sent a questionnaire to you. My records indicate that I have yet to hear from you. While I understand the demands on your time, it is very important that I have as high a response rate as possible. I would be most appreciative if you could complete the questionnaire and return it in the enclosed envelope by **May 10, 1985**.

- If you have already answered and returned the questionnaire, please accept this letter as my appreciation of your contribution and ignore the attached questionnaire.
- If you have no interest in computing and do not foresee yourself involved in any way, please let me know on this page and send the questionnaire back to me.
- If you need clarification concerning particular questionnaire item(s) call me at **432-3792**

Again, confidentiality of all responses will be maintained. Furthermore, results will be reported only in summary form to your department chairman. Thank you for your cooperation.

Yours truly,

Gabriel Navarro

SECTION I

Current Computer Application

Card 1

1-4

1. Which computer systems do you use?

(Check all the appropriate letter(s))

a. Computer Services (Amdahl/MTS) system? 5-9

b. PLATO system?

c. Office of Administrative Systems (OAS)?

d. Other system (Please specify)?____________________

e. None of the above **(SKIP TO QUESTION #3)**

2. What type of software **have you used** on the systems?

(Check all the appropriate letter(s) and specify the system)

a. Programming languages:____________________ 10-18

b. Simulation:____________________

c. Statistical analysis:____________________

d. Graphics:____________________

e. Textformatting:____________________

f. Data base applications (information storage and retrieval):__________

g. Computer assisted instruction:____________________

h. Administrative (students records, budgeting, accounting): __________

i. Other software (Please specify):____________________

3. What type of software would you like to use on the systems in the future (one year from now)?

Card 1

(Check all the appropriate letter(s))

19-27

a. Programming languages

b. Simulation

c. Statistical analysis

d. Graphics

e. Textformatting

f. Data base information, storage and retrieval

g. Computer assisted instruction

h. Administrative (students records, budgeting, accounting)

i. Other software (Please specify): ______________________

SECTION II

Needs for Computer Applications

Instructions

The following list consists of possible needs for computer applications. For each item you are asked to circle a number to indicate your perception of the importance, at present and in one year from now, of the item as it applies to you.

The numbers of the scale correspond to the following ratings:

1=no importance, 2=limited importance, 3=moderate importance, 4=considerable importance, 5=essential importance

	NEED	AT PRESENT	IN ONE YEAR	Card 1
1.	To acquire knowledge of the state-of-the-art of computer applications?	1 2 3 4 5	1 2 3 4 5	28-29
2.	To acquire knowledge about the type and amount of computer resources available on this campus?	1 2 3 4 5	1 2 3 4 5	30-31
3.	To improve skills in using computer terminals?	1 2 3 4 5	1 2 3 4 5	32-33
4.	To learn about innovative computer applications in your field with respect to:			
	Research	1 2 3 4 5	1 2 3 4 5	34-35
	Teaching	1 2 3 4 5	1 2 3 4 5	36-37
	Administration	1 2 3 4 5	1 2 3 4 5	38-39
5.	To understand the advice regarding computer services offered on this campus?	1 2 3 4 5	1 2 3 4 5	40-41

1=no importance, 2=limited importance, 3=moderate importance, 4=considerable importance, 5=essential importance

	NEED	AT PRESENT	IN ONE YEAR	Card 1
6.	To learn about the factors influencing computer resource allocation on this campus?			
	Political	1 2 3 4 5	1 2 3 4 5	42-43
	Socio-Economic	1 2 3 4 5	1 2 3 4 5	44-45
7.	To learn how to write your own programs?	1 2 3 4 5	1 2 3 4 5	46-47
8.	To learn about the operation and function of the University's services regarding computers?	1 2 3 4 5	1 2 3 4 5	48-49
9.	To learn where to access administrative information about students and staff?	1 2 3 4 5	1 2 3 4 5	50-51
10.	To know the location and accessibility of computer terminals on this campus?	1 2 3 4 5	1 2 3 4 5	52-53
11.	To know where to obtain support and trouble-shooting help about computer systems on campus?	1 2 3 4 5	1 2 3 4 5	54-55
12.	To attend in-service workshops related to computer applications?	1 2 3 4 5	1 2 3 4 5	56-57
13.	To acquire documentation of both the input and output of the major computer applications packages?	1 2 3 4 5	1 2 3 4 5	58-59
14.	To be aware of the compatibility among computers and microcomputers on this campus?	1 2 3 4 5	1 2 3 4 5	60-61
15.	Other needs (Please specify):			
	a. ______________________	1 2 3 4 5	1 2 3 4 5	62-63
	b. ______________________	1 2 3 4 5	1 2 3 4 5	64-65

SECTION III

Computing Facilities

Instructions

The next section is oriented toward discovering the extent to which you are familiar with the assistance in computing, offered at the University.

Please circle the appropriate **YES** or **NO** answer to indicate your present situation.

Main Computers	**MTS**	**OAS**	**PLATO**	**Card 2**
				1-4
1. Do you currently possess a terminal with access to the following systems? **(IF YOU HAVE ANSWERED NO TO ALL THREE, SKIP TO QUESTION #9)**	YES NO	YES NO	YES NO	5-7
2. Have you ever experienced any difficulties in using the systems? If yes, please specify: ____________	YES NO	YES NO	YES NO	8-10
3. Do you have access to the information you want and/or need concerning the systems used or not used? If none of them, give reasons: ____________	YES NO	YES NO	YES NO	11-13
4. Do you consider the acquisition of a computer terminal and its access to the systems worthwhile?	YES NO	YES NO	YES NO	14-16

		MTS	OAS	PLATO	Card 2
5.	Have you had the opportunity to discuss with computing services or OAS personnel, various approaches to solving computing problems which affect you? If no,why not?:________________________	YES NO	YES NO	YES NO	17-19
6.	Do you receive updated information or documentation for the computer systems and/or programs you use? **(IF NO, SKIP TO QUESTION #8)**	YES NO	YES NO	YES NO	20-22
7.	Can you easily understand the documentation or instructional guides supplied by the various computer services? If no, why not?:________________________	YES NO	YES NO	YES NO	23-25
8.	If you were asked for the solution to a problem a user may be having with the system, would you recommend contacting the appropriate computer services personnel for help? If no, where would you recommend seeking help?__________	YES NO	YES NO	YES NO	26-28

Other Computers

Card 2

9. Do you currently use a computer (Mini/Micro) other than MTS, OAS or PLATO? YES NO 29

If yes, which one(s): ____________________

(IF NO, SKIP TO QUESTION #19)

10. Did you acquire the (Mini/Micro) computer to perform tasks other than those offered by computer services (MTS, OAS, PLATO) ? YES NO 30

If yes, please specify which tasks: ____________________

11. Was your decision for acquiring the (Mini/Micro) computer based on a need for:

a. Control YES NO 31

b. Privacy YES NO 32

c. Cost of using central system YES NO 33

e. What other?: ____________________

		MTS	**OAS**	**PLATO**	
12.	Do you use this computer to connect with which system?	YES NO	YES NO	YES NO	34-36
13.	When you acquired this computer, did you receive or seek the advice of any personnel from these computing systems?	YES NO	YES NO	YES NO	37-39
14.	Are you aware of the degree of compatibility of your computer (Mini/Micro) with the computer services systems?	YES NO	YES NO	YES NO	40-42

(IF YES, GO TO NEXT QUESTION. IF NO, SKIP TO #16)

		MTS	OAS	PLATO	Card 2
15.	At the present time is your (Mini/Micro) computer connected to the computer services systems ?	YES NO	YES NO	YES NO	43-45
16.	If your (Mini/Micro) computer is not presently connected with the major systems, do you foresee or desire connecting it in the future?	YES NO	YES NO	YES NO	46-48
17.	If the software you currently use on the (Mini/Micro) computer was available on any of the systems (MTS, OAS, PLATO) would you be willing to use it?	YES NO	YES NO	YES NO	49-51
18.	Do you use any of the software provided by computer services systems ?	YES NO	YES NO	YES NO	52-54

General Aspects

19.	Do you know where the main computer services' offices are located?	YES NO	YES NO	YES NO	55-57
20.	Do you have a useful relationship with the computer services department(s)?	YES NO	YES NO	YES NO	58-60
21.	Do you encounter difficulties in exchanging information with or requesting help from the personnel at computer services? If yes, please specify: ____________________	YES NO	YES NO	YES NO	61-63
22.	Are you aware that the Department of Computing Services provides assistance regarding planning, purchasing, and general use of computers to users?	YES NO	YES NO	YES NO	64-66

23. If you have any suggestions which would improve the relationships between the computer services and users, please list them in the space below.

MTS: ______________________________

DAS: ______________________________

PLATO: ______________________________

24. What is your main source of information about computer services? **Card 3**

(Please rank the below items in order of importance to you) 1-4

1 most important, 10 least important

a. Magazines and Books: ______________________________ 5-6

b. Documents from Manufacturers: ______________________________ 7-8

c. Information from colleagues in your own department: ______________ 9-10

d. Information from colleagues in other universities: ______________ 11-12

e. Computer services documentation: ______________________________ 13-14

f. Computer services non-credit courses: ______________________________ 15-16

g. Computing science credit courses or other depts: ______________ 17-18

h. Technical literature: ______________________________ 19-20

i. Seminars or workshops organized by computer organizations: ______________ 21-22

j. Seminars or workshops organized by professional conferences: ______________ 23-24

Please feel free to indicate any additional co you have regarding your perception of the computer services offered by the University.

(PLEASE CHECK)

I would be willing to participate in a follow-up interview.

- Yes ....
- No ....

If yes please give me your:

Name: ______________________________

Phone # on campus:..........

Thank you for participating in this study.

PLEASE RETURN THIS QUESTIONNAIRE IN THE ENVELOPE PROVIDED

To: Gabriel Navarro
7th floor Ed. North
Department of Educational Administration
University of Alberta

ID: ....

APPENDIX B. LETTERS OF SUPPORT

THE UNIVERSITY OF ALBERTA

Department of Educational Administration

From: Dr. J. E. Seger
7-133E Educ North
University of Alberta
432-5868
Date: April 9, 1985
To: Department Chairman

The purpose of this letter is to elicit your cooperation in responding to a questionnaire entitled *"effectiveness of computing services offered at the University of Alberta"*. As you are already aware from Dr. Bent's correspondence, completion of this questionnaire will assist Mr, Gabriel Navarro in fulfilling his doctoral research requirements.

Mr. Navarro is my advisee in the Department of Educational Administration. As his chief supervisor I appreciate your cooperation and support in successfully discharging this study. Be assured that your responses will be held in strictest confidence, thus your anonimity is guaranteed. If you have further concerns or questions please direct them to my office.

Thank you very much for your prompt attention and gracious cooperation in this important matter.

Respectfully yours,

Dr. J. E. Seger

Department of Educational Administration

THE UNIVERSITY OF ALBERTA
Department of Computing Services

To: Department Chairman
From: Dale H. Bent
Director, Computing Services
352 General Services Building
432-4767
Date: 1985 March 26
Subject: **Ph.D. Survey by Mr. Gabriel Navarro**

This memo will serve to introduce Mr. Gabriel Navarro, Ph.D. candidate in the Department of Educational Administration. He has chosen for his thesis research the topic "effectiveness of computing services offered at the University of Alberta.

Our department is cooperating with Mr. Navarro in collection of data from selected academic departments relating to the above topic. In addition, Planning Group II, which recently circulated questionnaires to all faculty and department heads, will be making the results of those questionnaires (in summary form only) available to Mr. Navarro.

Mr. Navarro's research will, I hope, deepen the quality of information available to persons responsible for the operation of the computing services available on campus. We intend to cooperate with Mr. Navarro to use information collected as a basis for improving our services to customers.

I would greatly appreciate your support and any assistance you can provide Mr. Navarro in conducting his survey in your department.

MTS File: dhb:survey.help
DHB File: 85-03-26 13:39:34

APPENDIX C. GENERAL TABLES

Table 6.1

Frequencies of Access on the Systems

Total Population (N=79)

SYSTEM	SCI. COMP.		SOC. SC. COMP.		OTHER COMP.		TOTAL	
MTS	20	90.9%	27	83.9%	24	96.0%	71	89.9%
OAS	--		--		3	12.0%	3	3.8%
PLATO	3	13.6%	2	6.5%	2	8.0%	7	8.9%
OTHER	10	45.5%	10	32.3%	16	64.0%	36	45.6%
NONE	--		3	9.7%	1	4.0%	4	5.1%
TOTAL	22		32		25		79	

Table 6.2

Software Use at Present and in One Year from Now

(1) High Use (9) Low Use

SOFTWARE	SCI. COMP.		SOC. SC. COMP.		OTHER COMP.		TOTAL	
	Pres.	One Y.	Pres.	One Y.	Pres.	One Y.	Pres.	One Y.
Programming Languages	19 (1)	18 (1)	11 (3)	8 (6)	20 (1)	17 (1)	51 (2)	43 (3)
Simulation	9 (5)	10 (5)	- (9)	7 (7)	6 (7)	7 (8)	15 (8)	24 (6)
Statistical Analysis	11 (4)	12 (4)	22 (1)	22 (1)	11 (3)	10 (5)	45 (3)	45 (2)
Graphics	14 (3)	17 (2)	10 (5)	13 (3)	11 (4)	12 (4)	35 (4)	43 (4)
Textformatting	17 (2)	16 (3)	21 (2)	18 (2)	19 (2)	17 (2)	58 (1)	52 (1)
Data Base Application	8 (6)	9 (6)	10 (4)	11 (4)	10 (5)	16 (3)	28 (5)	37 (5)
Comp. Assisted Inst.	4 (8)	7 (7)	5 (7)	8 (5)	5 (9)	6 (9)	14 (9)	21 (8)
Administrative App.	3 (9)	7 (8)	3 (8)	6 (8)	10 (6)	8 (6)	16 (7)	22 (7)
Other Software	7 (7)	8 (9)	7 (6)	2 (9)	6 (8)	8 (7)	20 (6)	18 (9)

Table 6.3

Source of Information About Computers

(1) Most Important (10) Least Important

SOURCE	SCI. COMP.		SOC. SC. COMP.		OTHER COMP.		TOTAL	
	Mean	**Rank**	**Mean**	**Rank**	**Mean**	**Rank**	**Mean**	**Rank**
Magazines and Books	4.27	(4)	3.68	(3)	4.26	(4)	4.0[illegible]	(4)
Doc. from Manufacturers	3.42	(3)	4.11	(4)	4.42	(5)	3.98	(3)
Colleagues in the Dep.	2.52	(1)	2.29	(1)	2.18	(1)	2.42	(1)
Other Universities	6.00	(6)	5.92	(5)	7.00	(8)	6.43	(7)
Computing Serv. Docum.	2.71	(2)	2.81	(2)	2.71	(2)	2.73	(2)
C. Serv. Courses	6.00	(7)	5.93	(6)	7.05	(9)	6.35	(6)
C. Science Courses	8.29	(8)	7.66	(10)	5.57	(6)	7.04	(8)
Technical Literature	4.40	(5)	6.38	(7)	4.14	(3)	4.74	(5)
Seminars By Organizations	8.47	(10)	6.41	(8)	6.66	(7)	7.25	(9)
Seminars By Conferences	8.35	(9)	7.63	(9)	7.16	(10)	7.72	(10)

Table 6.4

Perceptions of Needs at Present and in One Year from Now

Scientific Computing Application

(1) No Importance (5) Essential Importance

	NEED TO:	(N=)	PRES. Mean	PRES. Rank	ONE Y. Mean	ONE Y. Rank	T-TEST Prob.	T-TEST Rank
1.	Acquire Knowledge of Computer Application	22	3.45	3	3.45	3	1.000	15
2.	Acquire Knowledge of Computer Resources	22	3.27	4	3.32	4	0.576	13
3.	Improve Skills in Computer Terminals	22	2.68	10	3.04	9	*0.042	3
4.	Learn to Use Computers for Research	20	3.80	1	3.85	2	0.577	14
5.	Learn to Use Computers for Teaching	21	3.14	5	3.14	6	1.000	16
6.	Learn to Use Computers for Administration	19	1.73	17	1.84	17	0.494	11
7.	Know Advice of Computing Services	20	2.60	11	2.60	11	1.000	17
8.	Learn Political Factors of Computer Resources	22	3.09	6	3.22	5	0.083	4

* Significant Beyond 0.05 level

** Significant Beyond 0.01 level

Continued

Table 6.4 (Continued)

(1) No Importance (5) Essential Importance

NEED TO:	(N=)	PRES.		ONE Y.		T-TEST	
		Mean	Rank	Mean	Rank	Prob.	Rank
9. Learn Socio-Economic Factors of Computer Resources	21	2.90	8	3.00	10	0.162	8
10. Learn to Write Programs	22	2.31	14	2.22	14	0.427	10
11. Learn Functions of Services	22	2.45	12	2.36	13	0.329	9
12. Learn Where Access Administrative Information	21	1.85	16	2.09	16	0.096	7
13. Know Location of Computer Terminals	22	2.00	15	2.13	15	0.083	5
14. Learn Where to Obtain Help	22	3.04	7	3.13	7	0.540	12
15. Attend Workshops	21	2.33	13	2.57	12	0.096	6
16. Acquire Documentation of Packages in Computers	19	2.73	9	3.05	8	*0.030	1
17. Be Aware of Compatibility Among Micro and Computers	22	3.63	2	3.95	1	*0.031	2

* Significant Beyond 0.05 level

** Significant Beyond 0.01 level

Table 8.5

Perceptions of Needs at Present and in One Year from Now

Social Science Computing Application

(1) No Importance (5) Essential Importance

	NEED TO:	(N=)	PRES. Mean	PRES. Rank	ONE Y. Mean	ONE Y. Rank	T-TEST Prob.	T-TEST Rank
1.	Acquire Knowledge of Computer Application	27	3.00	6	3.22	8	0.185	8
2.	Acquire Knowledge of Computer Resources	27	3.22	4	3.26	6	0.839	15
3.	Improve Skills in Computer Terminals	27	2.96	7	3.33	5	*0.015	2
4.	Learn to Use Computers for Research	28	3.57	2	3.75	2	*0.022	4
5.	Learn to Use Computers for Teaching	28	2.86	9	3.25	7	*0.013	1
6.	Learn to Use Computers for Administration	25	1.92	15	1.68	16	0.083	16
7.	Know Advice of Computing Services	23	3.39	3	3.52	4	0.328	9
8.	Learn Political Factors of Computer Resources	23	2.39	11	2.26	14	0.575	12

* Significant Beyond 0.05 level

** Significant Beyond 0.01 level

Continued

Table 6.5 (Continued)

(1) No Importance (5) Essential Importance

NEED TO:	(N=)	PRES. Mean	PRES. Rank	ONE Y. Mean	ONE Y. Rank	T-TEST Prob.	T-TEST Rank
9. Learn Socio-Economic Factors of Computer Resources	21	2.28	13	2.23	15	0.771	14
10. Learn to Write Programs	24	1.83	16	2.50	11	*0.015	3
11. Learn Functions of Services	24	2.33	12	2.33	12	1.000	17
12. Learn Where Access Administrative Information	26	1.57	17	1.61	17	0.664	13
13. Know Location of Computer Terminals	25	2.12	14	2.28	13	0.103	6
14. Learn Where to Obtain Help	25	3.16	5	3.52	3	*0.047	5
15. Attend Workshops	26	2.61	10	2.76	10	0.161	7
16. Acquire Documentation of Packages in Computers	24	2.87	8	3.00	9	0.377	10
17. Be Aware of Compatibility Among Micro and Computers	26	3.69	1	3.80	1	0.478	11

* Significant Beyond 0.05 level

** Significant Beyond 0.01 level

Table 8.6

Perceptions of Needs at Present and in One Year from Now

Other Type of Computing Application

(1) No Importance (5) Essential Importance

NEED TO:	(N=)	PRES. Mean	PRES. Rank	ONE Y. Mean	ONE Y. Rank	T-TEST Prob.	T-TEST Rank
1. Acquire Knowledge of Computer Application	24	3.70	2	3.87	3	*0.043	2
2. Acquire Knowledge of Computer Resources	24	3.00	7	3.00	7	1.[illegible]	15
3. Improve Skills in Computer Terminals	24	2.58	11	2.41	13	*0.043	17
4. Learn to Use Computer for Research	24	3.91	1	3.95	2	0.575	12
5. Learn to Use Computer for Teaching	23	3.26	5	3.34	4	0.162	4
6. Learn to Use Computer for Administration	23	2.47	13	2.56	11	0.162	5
7. Know Advice of Computing Services	22	2.59	10	2.68	9	0.162	6
8. Learn Pol. Factors of Comp. Resources	24	2.41	14	2.33	14	0.426	11

* Significant Beyond 0.05 level

** Significant Beyond 0.01 level

Continued

Table 6.6 (Continued)

(1) No Importance (5) Essential Importance

NEED TO:	(N=)	PRES. Mean	PRES. Rank	ONE Y. Mean	ONE Y. Rank	T-TEST Prob.	T-TEST Rank
9. Learn Socio-Economic Factors of Computer Resources	22	2.13	16	2.18	16	0.665	14
10. Learn to Write Programs	23	2.08	17	2.13	17	0.575	13
11. Learn Functions of Services	23	2.69	8	2.69	8	1.000	16
12. Learn Where Access Administrative Information	24	2.66	9	2.50	12	0.103	3
13. Know Location of Computer Terminals	23	2.56	12	2.65	10	0.328	8
14. Learn Where to Obtain Help	23	3.13	6	3.17	6	0.328	9
15. Attend Workshops	24	2.20	15	2.25	15	0.328	7
16. Acquire Documentation of Packages in Computers	23	3.30	4	3.26	5	0.328	10
17. Be Aware of Compatibility Among Micro and Computers	24	3.58	3	3.95	1	**0.001	1

* Significant Beyond 0.05 level

** Significant Beyond 0.01 level

Table 6.7

Perceptions of Needs at Present and in One Year from Now

Total Population (N=79)

(1) No Importance (5) Essential Importance

			PRES.		ONE Y.		T-TEST	
	NEED TO:	(N=)	Mean	Rank	Mean	Rank	Prob.	Rank
1.	Acquire Knowledge of Computer Application	74	3.35	3	3.48	3	*0.040	8
2.	Acquire Knowledge of Computer Resources	74	3.16	4	3.18	7	0.708	15
3.	Improve Skills in Computer Terminals	74	2.74	9	2.94	8	*0.015	4
4.	Learn to Use Computer for Research	73	3.72	1	3.82	2	*0.034	7
5.	Learn to Use Computer for Teaching	73	3.06	6	3.24	5	*0.015	5
6.	Learn to Use Computer for Administration	68	2.04	16	2.01	17	0.673	14
7.	Know Advice of Computing Services	66	2.86	8	2.93	9	0.167	11
8.	Learn Political Factors of Computer Resources	70	2.60	10	2.57	10	0.741	16

* Significant Beyond 0.05 level

** Significant Beyond 0.01 level

Continued

Table 6.7 (Continued)

(1) No Importance (5) Essential Importance

NEED TO:	(N=)	PRES.		ONE Y.		T-TEST	
		Mean	Rank	Mean	Rank	Prob.	Rank
9. Learn Socio-Economic Factors of Computer Resources	65	2.41	12	2.44	13	0.641	13
10. Learn to Write Programs	70	2.05	15	2.20	15	0.058	9
11. Learn Functions of Services	70	2.50	11	2.48	12	0.810	17
12. Learn Where Access Administrative Information	72	2.02	17	2.06	16	0.516	12
13. Know Location of Computer Terminals	71	2.21	14	2.33	14	*0.012	3
14. Learn Where to Obtain Help	71	3.09	5	3.26	4	*0.033	6
15. Attend Workshops	72	2.40	13	2.55	11	*0.011	2
16. Acquire Documentation of Packages in Computers	67	3.00	7	3.19	6	0.073	10
17. Be Aware of Compatibility Among Micro and Computers	73	3.65	2	3.91	1	**0.001	1

* Significant Beyond 0.05 level

** Significant Beyond 0.01 level

Table 6.8

Crosstabulation of Type of Computing Application and Questions
Regarding Computer Resources On Campus

MAIN COMP.	SCIENTIFIC COMPUTING				SOCIAL SC. COMPUTING				OTHER COMPUTING				TOTAL			
	YES		NO		YES		NO		YES		NO		YES		NO	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1. Do you currently possess a terminal with access to the following systems?																
MTS	19	90.5	2	9.5	17	58.6	12	41.4	22	91.7	2	8.3	58	78.4	16	21.6
OAS	1	6.3	15	93.8	-	-	22	100.0	2	10.5	17	89.5	3	5.3	54	94.7
PLATO	1	5.9	16	94.1	2	8.7	21	91.3	-	-	18	100.0	3	5.2	55	94.8
2. Have you ever experienced any difficulties in using the systems?																
MTS	10	52.6	9	47.4	12	63.2	7	36.8	15	65.2	8	34.8	37	60.7	24	39.3
OAS	-	-	4	100.0	-	-	3	100.0	2	33.3	4	66.7	2	15.4	11	84.6
PLATO	1	20.0	4	80.0	2	40.0	3	60.0	-	-	5	100.0	3	20.0	12	80.0
3. Do you have access to the information you want and/or need?																
MTS	19	95.0	1	5.0	16	94.1	1	5.9	21	95.5	1	4.5	56	94.9	3	5.1
OAS	1	16.7	5	83.3	3	100.0	-	-	3	60.0	2	40.0	7	50.0	7	50.0
PLATO	5	62.5	3	37.5	5	100.0	-	-	3	75.0	1	25.0	13	76.5	4	23.5
4. Do you consider the acquisition of a computer terminal and its access to the systems worthwhile?																
MTS	20	100.0	-	-	19	100.0	-	-	20	95.2	1	4.8	59	98.3	1	1.7
OAS	2	28.6	5	71.4	2	50.0	2	50.0	5	55.6	4	44.4	9	45.0	11	55.0
PLATO	4	44.4	5	55.6	3	60.0	2	40.0	3	37.5	5	62.5	10	45.5	12	54.5
5. Have you had the opportunity to discuss your approaches with computer services to solve them?																
MTS	15	75.0	5	25.0	17	89.5	2	10.5	16	72.7	6	27.3	48	78.7	13	21.3
OAS	1	12.5	7	87.5	-	-	3	100.0	6	75.0	2	25.0	7	36.8	12	63.2
PLATO	3	37.5	5	62.5	2	40.0	3	60.0	3	50.0	3	50.0	4	42.1	11	57.9

(Continued)

Table 8.8 (Continued)

MAIN COMP.	SCIENTIFIC COMPUTING				SOCIAL SC. COMPUTING				OTHER COMPUTING				TOTAL			
	YES		NO		YES		NO		YES		NO		YES		NO	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
6. Do you receive information or documentation for the computer systems you use?																
MTS	15	83.3	3	16.7	16	88.9	2	11.1	12	54.5	10	45.5	43	74.1	15	25.9
OAS	1	20.0	4	80.0	-	-	2	100.0	1	16.7	5	83.3	2	15.4	11	84.6
PLATO	3	60.0	2	40.0	1	33.3	2	66.7	-	-	5	100.0	4	30.8	9	69.2
7. Can you easily understand the documentation provided by the various computer services?																
MTS	11	73.3	4	26.7	9	69.2	4	30.8	14	87.5	2	12.5	34	77.3	10	22.7
OAS	2	50.0	2	50.0	-	-	1	100.0	2	50.0	2	50.0	4	44.4	5	55.6
PLATO	4	80.0	1	20.0	1	50.0	1	50.0	-	-	2	100.0	5	55.6	4	44.4
8. Would you recommend contacting the appropriate computer services personnel for help?																
MTS	16	84.2	3	15.2	14	87.5	2	28.6	18	90.0	2	10.0	48	87.3	7	12.7
OAS	2	40.0	3	60.0	-	-	-	-	3	100.0	-	-	5	62.5	3	37.5
PLATO	4	66.7	2	33.3	2	100.0	-	-	3	100.0	-	-	9	81.8	2	18.2

Table 8.9

Crosstabulation of Type of Computing Application and Questions
Regarding Computer Resources On Campus

OTHER COMP.	SCIENTIFIC COMPUTING				SOCIAL SC. COMPUTING				OTHER COMPUTING				TOTAL			
	YES		NO		YES		NO		YES		NO		YES		NO	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
9. Do you currently use a (Mini/Micro) computer other than MTS, OAS or PLATO?																
	14	66.7	7	33.3	21	70.0	9	30.0	15	71.4	6	28.6	50	69.4	22	30.6
10. Did you acquired the (Mini/Micro) computer to perform different tasks other than those of MTS, OAS, or PLATO?																
	12	85.7	2	14.3	11	52.4	10	47.6	13	72.2	5	27.8	36	67.9	17	32.1
11a. Was your decision for acquiring the (Mini/Micro) computer based on a need for control?																
	13	92.9	1	7.1	14	87.5	2	12.5	7	50.0	7	50.0	34	77.3	10	22.7
11b. Was your decision for acquiring the (Mini/Micro) computer based on a need for privacy?																
	4	33.3	8	66.7	4	26.7	11	73.3	6	42.9	8	57.1	14	34.1	27	65.9
11c. Was your decision for acquiring the (Mini/Micro) computer based on a need for cost of using the central system?																
	7	53.8	6	46.2	13	68.4	6	31.6	9	56.3	7	43.8	29	60.4	19	39.6

(Continued)

Table 8.9 (Continued)

OTHER COMP.	SCIENTIFIC COMPUTING				SOCIAL SC. COMPUTING				OTHER COMPUTING				TOTAL			
	YES		NO		YES		NO		YES		NO		YES		NO	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
12. Do you use this computer to connect with which system?																
MTS	13	86.7	2	13.3	13	61.9	8	38.1	16	88.9	2	11.1	42	77.8	12	22.2
OAS	-	-	8	100.0	-	-	12	100.0	-	-	12	100.0	-	-	32	100.0
PLATO	-	-	8	100.0	3	21.4	11	78.6	-	-	12	100.0	3	8.8	31	91.2
13. Did you receive or seek advice of any personnel from these computer services?																
MTS	5	33.3	10	66.7	11	55.0	9	45.0	3	18.8	13	81.3	19	37.3	32	62.7
OAS	-	-	7	100.0	-	-	9	100.0	-	-	9	100.0	-	-	25	100.0
PLATO	1	12.5	7	87.5	2	20.0	8	80.0	-	-	9	100.0	3	11.1	24	88.9
14. Are you aware of the compatibility of your (Mini/Micro) computer with the computer services systems?																
MTS	14	93.3	1	6.7	18	90.0	2	10.0	15	88.2	2	11.8	47	90.4	5	9.6
OAS	2	33.3	4	66.7	2	28.6	5	71.4	4	50.0	4	50.0	8	38.1	13	61.9
PLATO	3	42.9	4	57.1	5	50.0	5	50.0	3	37.5	5	62.5	11	44.0	14	56.0
15. At the present time is your (Mini/Micro) computer connected to the computer services systems?																
MTS	11	78.6	3	21.4	9	47.4	10	52.6	13	76.5	4	23.5	33	66.0	17	34.0
OAS	-	-	4	100.0	-	-	7	100.0	-	-	6	100.0	-	-	17	100.0
PLATO	-	-	4	100.0	3	33.3	6	66.7	-	-	6	100.0	3	15.8	16	84.2

(Continued)

Table 6.9 (Continued)

OTHER COMP.	SCIENTIFIC COMPUTING				SOCIAL SC. COMPUTING				OTHER COMPUTING				TOTAL			
	YES		NO		YES		NO		YES		NO		YES		NO	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
16. If your (Mini/Micro) computer is not presently connected do you foresee connecting it in the future?																
MTS	3	75.0	1	25.0	10	83.3	2	16.7	7	100.0	-	-	20	87.0	3	13.0
OAS	3	60.0	2	40.0	2	33.3	4	66.7	4	57.1	3	42.9	9	50.0	9	50.0
PLATO	2	50.0	2	50.0	2	28.6	5	71.4	1	20.0	4	80.0	5	31.3	11	68.8
17. If the software of your (Mini/Micro) computer was available on any system would you be willing to use it?																
MTS	6	46.2	7	53.8	15	78.9	4	21.1	12	80.0	3	20.0	33	70.2	14	29.8
OAS	2	40.0	3	60.0	4	50.0	4	50.0	4	44.4	5	55.6	10	45.5	12	54.5
PLATO	3	50.0	3	50.0	7	70.0	3	30.0	5	62.5	3	37.5	15	62.5	9	37.5
18. Do you use any of the software provided by computer services systems?																
MTS	9	60.0	6	40.0	10	52.6	9	47.4	14	87.5	2	12.5	33	66.0	17	34.0
OAS	-	-	6	100.0	-	-	9	100.0	-	-	7	100.0	-	-	22	100.0
PLATO	-	-	6	100.0	3	27.3	8	72.7	-	-	7	100.0	3	12.5	21	87.5

6

Table 6.10

Crosstabulation of Type of Computing Application and Questions
Regarding Computer Resources On Campus

GRAL. ASP.	SCIENTIFIC COMPUTING YES N	%	NO N	%	SOCIAL SC. COMPUTING YES N	%	NO N	%	OTHER COMPUTING YES N	%	NO N	%	TOTAL YES N	%	NO N	%
19. Do you know where the main computer services' offices are located?																
MTS	22	100.0	-	-	29	93.5	2	6.5	22	88.0	3	12.0	73	93.6	5	6.4
OAS	1	11.1	8	88.9	6	35.3	11	64.7	6	50.0	6	50.0	13	34.2	25	65.8
PLATO	8	72.7	3	27.3	10	55.6	8	44.4	6	54.5	5	45.5	24	60.0	[illegible]	40.0
20. Do you have a useful relationship with the computer services department(s)?																
MTS	16	72.7	6	27.3	20	80.0	5	20.0	15	68.2	7	31.8	51	73.9	18	26.1
OAS	-	-	6	100.0	4	30.8	9	69.2	5	50.0	5	50.0	9	31.0	20	69.0
PLATO	4	44.4	5	55.6	7	50.0	7	50.0	-	-	8	100.0	11	35.5	20	64.5
21. Do you encounter difficulties with or requesting help from computer services?																
MTS	2	10.5	17	89.5	3	11.1	24	88.9	7	30.4	16	69.6	12	17.4	57	82.6
OAS	1	20.0	4	80.0	1	10.0	9	90.0	-	-	8	100.0	2	8.7	21	91.3
PLATO	1	12.5	7	87.5	2	16.7	10	83.3	-	-	6	100.0	3	11.5	23	88.5
22. Are you aware of the assistance provided by the computer services department(s)?																
MTS	13	59.1	9	40.9	23	76.7	7	23.3	15	60.0	10	40.0	51	66.2	26	33.8
OAS	1	20.0	4	80.0	7	58.3	5	41.7	1	12.5	7	87.5	9	36.0	16	64.0
PLATO	1	16.7	5	83.3	10	71.4	4	28.6	1	12.5	7	87.5	12	42.9	16	57.1

APPENDIX D. TWO-WAY ANALYSIS OF VARIANCE TABLES

Table 7.1

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

1. Acquire knowledge of computer applications

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	11.948	3	3.983	2.782	0.048
Department	4.560	2	2.280	1.593	0.211
Intensity	4.345	1	4.345	3.035	0.086
2-Way Interactions	0.321	2	0.161	0.112	0.894
Dep. Intens	0.321	2	0.161	0.112	0.894
Explained	12.269	5	2.454	1.714	0.144
Residual	93.055	65	1.432		
Total	105.324	70	1.505		

Table 7.2

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

2. Acquire knowledge of computer resources

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	1.456	3	0.485	0.375	0.771
Department	1.361	2	0.681	0.526	0.594
Intensity	0.315	1	0.315	0.243	624
2-Way Interactions	1.007	2	0.504	0.389	0.679
Dep. Intens	1.007	2	0.504	0.389	0.679
Explained	2.463	5	0.493	0.380	0.860
Residual	84.157	65	1.295		
Total	86.620	70	1.237		

Table 7.3

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

3. Improve skills using computer terminals

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	1.413	3	0.471	0.311	0.817
Department	0.469	2	0.235	0.155	0.857
Intensity	0.620	1	0.620	0.410	524
2-Way Interactions	5.630	2	2.815	1.860	0.164
Dep. Intens	5.630	2	2.815	1.860	0.164
Explained	7.043	5	1.409	0.931	0.467
Residual	98.393	65	1.514		
Total	105.437	70	1.506		

Table 7.4

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

4. To learn the use of computer for research application

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	5.355	3	1.785	1.078	0.365
Department	1.396	2	0.698	0.422	0.658
Intensity	2.673	1	2.673	1.615	0.208
2-Way Interactions	0.842	2	0.471	0.285	0.753
Dep. Intens	0.842	2	0.471	0.285	0.753
Explained	6.297	5	1.259	0.761	0.581
Residual	107.619	65	1.656		
Total	113.915	70	1.627		

Table 7.5

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

5. To learn the use of the computer for teaching

SOURCE OF VARIATIONS	**SUM OF SQUARES**	**DF**	**MEAN SQUARE**	**F**	**SIGNIF OF F**
Main Effects	3.447	3	1.149	0.895	0.448
Department	0.629	2	0.314	0.245	0.783
Intensity	2.034	1	2.034	1.585	0.212
2-Way Interactions	5.793	2	2.896	2.257	0.113
Dep. Intens	5.793	2	2.896	2.257	0.113
Explained	9.240	5	1.848	1.440	0.222
Residual	83.408	65	1.283		
Total	92.648	70	1.324		

Table 7.8

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

6. To learn the use of the computer for administration

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	10.723	3	3.574	3.436	0.024
Department	6.755	2	3.378	3.246	0.047
Intensity	2.271	1	2.271	2.183	0.146
2-Way Interactions	0.614	2	0.307	0.295	0.746
Dep. Intens	0.614	2	0.307	0.295	0.746
Explained	11.337	5	2.267	2.179	0.071
Residual	52.020	50	1.040		
Total	63.357	55	1.152		

Table 7.7

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

7. To understand the advice offered on campus

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	13.590	3	4.530	2.776	0.051
Department	8.433	2	4.217	2.584	0.086
Intensity	2.955	1	2.955	1.811	0.184
2-Way Interactions	0.167	2	0.083	0.051	0.950
Dep. Intens	0.167	2	0.083	0.051	0.950
Explained	13.757	5	2.751	1.686	0.155
Residual	81.600	50	1.632		
Total	95.357	55	1.734		

Table 7.8

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

8. To learn political factors for computer allocation

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	17.364	3	5.788	4.110	0.011
Department	6.820	2	3.410	2.422	0.099
Intensity	10.999	1	10.999	7.811	007
2-Way Interactions	4.206	2	2.103	1.493	0.234
Dep. Intens	4.206	2	2.103	1.493	0.234
Explained	21.569	5	4.314	3.063	0.017
Residual	70.413	50	1.408		
Total	91.982	55	1.672		

Table 7.9

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

9. To learn socio-economic factors in computers

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	14.917	3	4.972	3.292	0.028
Department	6.803	2	3.401	2.252	0.116
Intensity	9.499	1	9.499	6.289	0.015
2-Way Interactions	3.112	2	1.556	1.030	0.364
Dep. Intens	3.112	2	1.556	1.030	0.364
Explained	18.030	5	3.606	2.387	0.051
Residual	75.524	50	1.510		
Total	93.554	55	1.701		

Table 7.10

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

10. To learn how to write my own programs

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	4.145	3	1.382	0.861	0.468
Department	4.044	2	2.022	1.260	0.293
Intensity	0.296	1	0.296	0.184	670
2-Way Interactions	0.456	2	0.228	0.142	0.868
Dep. Intens	0.456	2	0.228	0.142	0.868
Explained	4.601	5	0.920	0.573	0.720
Residual	80,256	50	1.605		
Total	84.857	55	1.543		

Table 7.11

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

11. To learn function of services in computing

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	2.386	3	0.795	0.553	0.648
Department	2.371	2	1.185	0.825	0.443
Intensity	0.076	1	0.076	0.053	0.819
2-Way Interactions	0.258	2	0.129	0.090	0.914
Dep. Intens	0.258	2	0.129	0.090	0.914
Explained	2.643	5	0.529	0.368	0.869
Residual	90.574	63	1.438		
Total	93.217	68	1.371		

Table 7.12

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

12. To know where to access administrative information

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	19.952	3	6.651	5.883	0.001
Department	12.643	2	6.322	5.592	0.006
Intensity	2.840	1	2.840	2.512	118
2-Way Interactions	4.765	2	2.382	2.107	0.130
Dep. Intens	4.765	2	2.382	2.107	0.130
Explained	24.717	5	4.943	4.372	0.002
Residual	71.225	63	1.131		
Total	95.942	68	1.411		

Table 7.13

Two-Way Analysis of Variance by Department
Type and Intensity of Use of Computers
13. To know location of terminals on campus

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	4.999	3	1.666	1.312	0.278
Department	4.851	2	2.426	1.910	0.157
Intensity	0.711	1	0.711	0.560	0.457
2-Way Interactions	1.539	2	0.769	0.606	0.549
Dep. Intens	1.539	2	0.769	0.606	0.549
Explained	6.538	5	1.308	1.030	0.408
Residual	80.013	63	1.270		
Total	86.551	68	1.273		

Table 7.14

Two-Way Analysis of Variance by Department
Type and Intensity of Use of Computers
14. Where to get support and help

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	7.060	3	2.353	1.453	0.236
Department	1.477	2	0.739	0.456	0.636
Intensity	6.443	1	6.443	3.977	050
2-Way Interactions	1.880	2	0.940	0.580	0.563
Dep. Intens	1.880	2	0.940	0.580	0.563
Explained	8.939	5	1.788	1.104	0.367
Residual	102.046	63	1.620		
Total	110.986	68	1.632		

Table 7.15

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

15. To attend workshops about computer applications

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	6.213	3	2.071	1.626	0.192
Department	1.038	2	0.519	0.407	0.667
Intensity	4.019	1	4.019	3.155	0.081
2-Way Interactions	0.877	2	0.438	0.344	0.710
Dep. Intens	0.877	2	0.438	0.344	0.710
Explained	7.089	5	1.418	1.113	0.363
Residual	80.244	63	1.274		
Total	87.333	68	1.284		

Table 7.16

Two-Way Analysis of Variance by Department
Type and Intensity of Use of Computers
16. To aquire documentation of major applications

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	5.407	3	1.802	1.234	0.305
Department	2.395	2	1.198	0.820	0.445
Intensity	1.616	1	1.616	1.107	297
2-Way Interactions	0.490	2	0.245	0.168	0.846
Dep. Intens	0.490	2	0.245	0.168	0.846
Explained	5.898	5	1.180	0.808	0.549
Residual	89.087	61	1.460		
Total	94.985	66	1.439		

Table 7.17

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

17. To be aware of compatibility among micro-comp.

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	3.783	3	1.261	0.786	0.506
Department	0.957	2	0.478	0.298	0.743
Intensity	3.596	1	3.596	2.243	0.139
2-Way Interactions	0.315	2	0.158	0.098	0.906
Dep. Intens	0.315	2	0.158	0.098	0.906
Explained	4.099	5	0.820	0.511	0.767
Residual	97.812	61	1.603		
Total	101.910	66	1.544		

Table 7.18

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

1. Acquire knowledge of computer applications

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	10.884	3	3.628	2.662	0.056
Department	6.229	2	3.115	2.285	0.110
Intensity	2.059	1	2.059	1.511	224
2-Way Interactions	3.604	2	1.802	1.322	0.274
Dep. Intens	3.604	2	1.802	1.322	0.274
Explained	14.488	5	2.898	2.126	0.074
Residual	84.497	62	1.363		
Total	98.985	67	1.477		

Table 7.19

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

2. Acquire knowledge of computer resources

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	1.277	3	0.426	0.318	0.812
Department	1.234	2	0.617	0.462	0.632
Intensity	0.002	1	0.002	0.001	0.970
2-Way Interactions	0.376	2	0.188	0.141	0.869
Dep. Intens	0.376	2	0.188	0.141	0.869
Explained	1.653	5	0.331	0.247	0.940
Residual	82.862	62	1.336		
Total	84.515	67	1.261		

Table 7.20

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

3. To improve skills using computer terminals

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	12.187	3	4.062	2.514	0.067
Department	6.346	2	3.173	1.964	0.149
Intensity	2.931	1	2.931	1.814	183
2-Way Interactions	2.628	2	1.314	0.813	0.448
Dep. Intens	2.628	2	1.314	0.813	0.448
Explained	14.815	5	2.963	1.834	0.119
Residual	100.170	62	1.616		
Total	114.985	67	1.716		

Table 7.21

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

4. To learn the use of the computer for research application

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	2.441	3	0.814	0.504	0.681
Department	0.915	2	0.458	0.284	0.754
Intensity	0.858	1	0.858	0.532	0.469
2-Way Interactions	0.063	2	0.031	0.019	0.981
Dep. Intens	0.063	2	0.031	0.019	0.905
Explained	2.504	5	0.501	0.310	0.905
Residual	100.026	62	1.613		
Total	102.529	67	1.530		

Table 7.22

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

5. To learn the use of the computer for teaching

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	1.090	3	0.363	0.281	0.839
Department	0.543	2	0.271	0.210	0.811
Intensity	0.416	1	0.416	0.322	573
2-Way Interactions	10.420	2	5.210	4.029	0.023
Dep. Intens	10.420	2	5.210	4.029	0.023
Explained	11.510	5	2.302	1.780	0.130
Residual	80.181	62	1.293		
Total	91.691	67	1.369		

Table 7.23

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

6. To learn the use of the computer for administration

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	12.301	3	4.100	4.125	0.011
Department	7.342	2	3.671	3.693	0.032
Intensity	2.510	1	2.510	2.525	0.119
2-Way Interactions	0.799	2	0.400	0.402	0.671
Dep. Intens	0.799	2	0.400	0.402	0.671
Explained	13.100	5	2.620	2.636	0.035
Residual	47.715	48	0.994		
Total	60.815	53	1.147		

Table 7.24

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

7. To understand the advice offered on campus

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	15.716	3	5.239	3.060	0.037
Department	8.699	2	4.349	2.541	0.089
Intensity	3.987	1	3.987	2.329	134
2-Way Interactions	0.039	2	0.020	0.011	0.989
Dep. Intens	0.039	2	0.020	0.011	0.989
Explained	15.755	5	3.151	1.841	0.123
Residual	82.170	48	1.712		
Total	97.926	53	1.848		

Table 7.25

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

8. To learn political factors for computer allocation

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	17.198	3	5.733	4.327	0.009
Department	8.340	2	4.170	3.147	0.052
Intensity	9.535	1	9.535	7.197	0.010
2-Way Interactions	8.544	2	4.272	3.225	0.049
Dep. Intens	8.544	2	4.272	3.225	0.049
Explained	25.742	5	5.148	3.886	0.005
Residual	63.592	48	1.325		
Total	89.333	53	1.686		

Table 7.26

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

9. To learn socio-economic factors in computers

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	12.383	3	4.128	3.148	0.033
Department	5.224	2	2.612	1.992	0.148
Intensity	7.690	1	7.690	5.865	019
2-Way Interactions	5.515	2	2.758	2.103	0.133
Dep. Intens	5.515	2	2.758	2.103	0.133
Explained	17.898	5	3.580	2.730	0.030
Residual	62.936	48	1.311		
Total	80.8334	53	1.525		

Table 7.27

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

10. To learn how to write my own programs

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	1.534	3	0.511	0.267	0.849
Department	0.957	2	0.478	0.249	0.780
Intensity	0.499	1	0.499	0.260	0.612
2-Way Interactions	2.363	2	1.182	0.616	0.544
Dep. Intens	2.363	2	1.182	0.616	0.544
Explained	3.898	5	0.780	0.406	0.842
Residual	92.102	48	1.919		
Total	96.000	53	1.811		

Table 7.28

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

11. To learn functions of services in computing

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	1.684	3	0.561	0.373	0.773
Department	1.021	2	0.510	0.339	0.714
Intensity	0.255	1	0.255	0.169	682
2-Way Interactions	0.439	2	0.220	0.146	0.865
Dep. Intens	0.439	2	0.220	0.146	0.865
Explained	2.123	5	0.425	0.282	0.921
Residual	90.362	60	1.506		
Total	92.485	65	1.423		

Table 7.29

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

12. To know where to access administrative information

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	13.103	3	4.368	3.145	0.032
Department	6.308	2	3.154	2.271	0.112
Intensity	3.278	1	3.278	2.361	0.130
2-Way Interactions	3.030	2	1.515	1.091	0.342
Dep. Intens	3.030	2	1.515	1.091	0.342
Explained	16.134	5	3.227	2.324	0.054
Residual	83.321	60	1.389		
Total	99.455	65	1.530		

Table 7.30

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

13. To know location of terminals on campus

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	3.953	3	1.318	0.884	0.455
Department	3.677	2	1.839	1.233	0.299
Intensity	0.781	1	0.781	0.524	472
2-Way Interactions	2.546	2	1.273	0.854	0.431
Dep. Intens	2.546	2	1.273	0.854	0.431
Explained	6.499	5	1.300	0.872	0.505
Residual	89.440	60	1.491		
Total	95.939	65	1.476		

Table 7.31

Two-Way Analysis of Variance by Department
Type and Intensity of Use of Computers
14. Where to get support and help

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	10.355	3	3.452	2.240	0.093
Department	2.610	2	1.305	0.847	0.434
Intensity	6.263	1	6.263	4.064	0.048
2-Way Interactions	0.778	2	0.389	0.252	0.778
Dep. Intens	0.778	2	0.389	0.252	0.778
Explained	11.133	5	2.227	1.445	0.221
Residual	92.458	60	1.541		
Total	103.591	65	1.594		

Table 7.32

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

15. To attend workshops about computer applications

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	6.673	3	2.224	1.694	0.178
Department	1.028	2	0.514	0.391	0.678
Intensity	4.006	1	4.006	3.050	86
2-Way Interactions	0.963	2	0.482	0.367	0.695
Dep. Intens	0.963	2	0.482	0.367	0.695
Explained	7.636	5	1.527	1.163	0.338
Residual	78.803	60	1.313		
Total	86.439	65	1.330		

Table 7.33

Two-Way Analysis of Variance by Department
Type and Intensity of Use of Computers
16. To acquire documentation of major applications

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	1.637	3	0.546	0.377	0.770
Department	0.357	2	0.179	0.123	0.884
Intensity	0.762	1	0.762	0.527	0.471
2-Way Interactions	1.823	2	0.911	0.630	0.536
Dep. Intens	1.823	2	0.911	0.630	0.536
Explained	3.460	5	0.692	0.478	0.791
Residual	86.798	60	1.447		
Total	90.258	65	1.389		

Table 7.34

Two-Way Analysis of Variance by Department

Type and Intensity of Use of Computers

17. To be aware of compatibility among micro-comp.

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
Main Effects	1.973	3	0.658	0.426	0.735
Department	0.034	2	0.017	0.011	0.989
Intensity	1.647	1	1.647	1.067	06
2-Way Interactions	0.429	2	0.214	0.139	0.871
Dep. Intens	0.429	2	0.214	0.139	0.871
Explained	2.402	5	0.480	0.311	0.904
Residual	92.629	60	1.544		
Total	95.030	65	1.462		

APPENDIX E. DEFINITIONS OF COMPUTER TERMS

For the purpose of this study, the following definitions of terms are used.

Access. Used as a verb describing the process of obtaining data from a peripheral unit or retrieving it from a storage device.

Bit. A bit (BInary-digiT) can be thought of as representing a simple yes/no choice, or as representing the distinction between true and false, or any other two-way choice.

Byte. A byte is usually used to represent an alphanumeric character or a number in the range 0 to 255.

Computer. A device that can receive and then follow instructions to manipulate information and text as well as numbers.

Computerized. A peculiar dialect related to computers.

Computer Architecture. Is the configuration of the system which provides the facilities of a computer system, to receive and store information, perform arithmetic functions, make decisions and produce results.

Computer Assisted Instruction. Is a teaching process directly involving the computer in the presentation of instructional materials in an interactive mode to provide and control the individualized learning environment for each individual student.

Computer Concepts. All the terms related to computers and their applications.

Computer Literacy. Is the knowledge and understanding of how a computer works, what software and hardware are available for certain use, what computers can and cannot do.

Computer Operations. Operations related to the characteristics of the computer in order to work with a set of programs and subroutines that controls the execution of programs and provides services such as language translation.

Computer Run. Is the execution of a program or several programs through the computer with retrieval of the results.

Computer Science. Concepts of electronics and technology of computers (eg. computer architecture, computer operation, computer programming and computer application).

Computer System. Is the set of hardware and software through which the application is processed.

Computer Terminal. A peripheral device consisting of a keyboard through which a person can send information to the computer and a screen through which the computer can present information to the person.

Computing. Operation related to the characteristics of the computer in order to work with a set of programs, packages that controls the execution of systems providing services for the users. Similar term to Computer operation.

Control Computer. A computer used in process control where the process under control feeds signals to the control computer which in turn sends signals back which directly control the operation of the process.

Data Bank. A set of files with information of any kind, often the idea of numerical information is implied.

File. In the computer context means a collection of information with a common subject such as an inventory file, a personnel file, a student record file, etc.

Hardware. The physical parts of a computer.

K. Stands for Kilo which means one thousand. In computerized terms 1K is usually used to mean 1024 but sometimes stands for 1000. A computer with 32K bytes of memory usually means that the computer has 32768 (32 times 1024) bytes of memory.

Mainframe. It refers to the central processor itself. It coordinates and controls the activities of all the units and performs all the arithmetic and logical processes to be applied to data.

Memory. Is the portion of a computer which stores information.

Minicomputer. A computer larger and more powerful than the microcomputer, but smaller than a full size computer system.

Microcomputer. A computer based on a microprocessor.

Microprocessor. A small central processor used in microcomputers.

Network. This term is often used to refer to both, a collection of computers and communication hardware (physical network) and the groups of individuals connected by telecommunications links (logical network).

Programs. A sequence of instructions that describe a process (must be in a language that a computer can understand).

Programming. The action of developing and making a program.

RAM. An acronym for "Random Access Memory". This is the main memory of any computer. Information and programs are stored in RAM and they may be retrieved or changed by a program.

Scientific Computer. A computer used for scientific data processing.

Scientific Computing. Data processing for scientific purposes, usually requiring machines with great computational power and with characteristics of low volume of input-output.

Scientific Language. A language designed for the writing of mathematical or scientific programs.

Screen. A surface on which information is displayed, such as a TV screen.

Software. A term used to refer to all programs which can be used on a particular computer system.

Textformatting. Writing, editing and printing textual material via a computer system.

Users' Group. An association of people who all have an interest in a particular computer or group of computers. They usually meet to exchange information, share programs and trade equipment.

User-Friendliness. Information provided by a computer system which makes the system easy to understand and easy to use.

APPENDIX F. INTERVIEW GUIDE

1. Please introduce yourself (Pause)

   Tell me about the position you held at the University of Alberta?

2. Can you describe specifically what have you used the computer for recently?

   -Research

   -Teaching

   -Administration

3. How would you describe your expertise in computers?

   -Expert

   -Some how expert

   -Little expertise

   -Non experience

4. What obstacles have there been to your use of the computer associated with your position?

   -With the software

   -Within the department

   -With computing services

5. What do you think the computer should be able to do for you?

   Can you characterize your needs in the use of the computers?

6. What changes would you like to see, so you can improve your use of computers?

7. What is your perception of the overall use of the computer by other members on your department?

   Is the use of the computer consistent among department members?

8. Have there been any complaints about the use of computers in your department?

   How would you characterize those complaints?

9. Have you ever had to call Computing Services for help?

   Can you describe what the interchange was like?

   Can you describe any good impressions you received from this communication?

   Can you describe any bad impressions you received from this communication?

10. Is there any other computer system you have seen that intrigues you?

    Why?

    What about Microcomputers?

11. What system do you like best?

    -MTS ?

    -OAS ?

    -PLATO ?

    -MICROS ?

    WHY?